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THE

Psychological Bulletin

EDITED BY

SHEPHERD I. FRANZ, GOVT. HOSP. FOR INSANE

HOWARD C. WARREN, PRINCETON UNIVERSITY (*Index*)

JOHN B. WATSON, JOHNS HOPKINS UNIVERSITY (*Review*) AND

JAMES R. ANGELL, UNIVERSITY OF CHICAGO (*Monographs*)

WITH THE CO-OPERATION OF

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THE
PSYCHOLOGICAL BULLETIN

IMAGERY ILLUSIONS. THE NON-VISUAL CHARACTER
OF THE PROOFREADER'S ILLUSION¹

BY ARTHUR H. PIERCE

The object of this paper is twofold. First, the question will be raised whether certain illusions, of which the oft-cited proofreader's illusion may be taken as a convenient instance, are really errors of perception. It will be maintained that they are not, but that they are due to an erroneous *imagery* that gets aroused. In the second place, on the analysis leading to the above conclusion a classification of illusions will be presented based on the degree of examinability which any suspected perceptual experience allows.

I

One who had never experienced the proofreader's illusion but was familiar with the numberless descriptions of it that are given in the books, would be likely to regard as a sheer paradox the statement that this need not be a visual illusion at all. Yet such is the thesis which this paper undertakes to uphold. A curious error appears to have been perpetuated in connection with this proofreader's illusion. Very simply and directly stated the error consists in maintaining that when we overlook a misprinted word and read it as if it were correct, the correctly printed word is actually *seen* by the reader,—the illusion consisting, of course, in the non-correspondence between what is actually seen and what is really there. Let me quote from three relatively recent writers. Professor Angell, on page 132 (ed. 4, p. 162) of his *Psychology*, says: "Thus, if we come across the word mispirnt, many of us will read

¹This paper, hitherto unpublished, was read by the late Professor Pierce at the meeting of the American Psychological Association in 1906.

it in all good faith as misprint and never see the difference. We react to the general visual impression and its suggestion, and see what really is not before us." And Professor Thorndike, on page 230 of his *Elements of Psychology*, says: "Thus in reading, some of the words which we feel ourselves to see are not seen at all and others are seen as quite different from their actual printed forms." And Professor Witmer, in language hardly less unambiguous, writes on page 23 of his *Analytical Psychology*: "The failure to observe an error demonstrates that the tendency to apperceive words as they would appear when correctly printed is strong enough to modify the perception received from the word as it is really printed."

Now, speaking for myself, this view receives no introspective support. I find no evidence that I *see* a correctly printed word. The fact is, indeed, that I *read* the word correctly, but this is by no means necessarily a visual act. It is more likely to be an affair of articulation—actual or imaged—or at least of some variety of non-visual imagery, very possibly auditory in character. In the rapid movements of reading, only enough of the misprinted word is seen to evoke the usual and expected escort. In reading aloud this would be the movement of articulation. The right word would be pronounced because a sufficient number of the word's salient features would have been seen to make this easily possible. When not reading aloud, however, there are several situations conceivable. (1) The portions of the word that are actually seen may receive a central supplementing that is entirely *visual* in character. In this case the illusion would indeed be visual. And it is this single possibility that seems to have occupied the attention of writers too exclusively. Or, (2) the portions of the word that are actually seen may associatively arouse some form of *non-visual* imagery representative of the correct word. This imagery may be *articulatory*, the word being mentally pronounced as it should be; or *auditory*, the correct word being mentally heard; or it may be that the grapho-motor, or any other conceivably adequate non-visual imagery, is what gets aroused by the actually seen fragments of the printed word. In none of these cases can the illusion be called visual. Our temptation to so name it comes, I suppose, from the expectation that if we again look at the word, we shall see the exact equivalent of what we have just been mentally pronouncing or mentally hearing.

I have no experiments to cite in support of the second alterna-

tive, nor am I acquainted with any experimental data which can be called upon to decide the issue. Indeed, for reasons that will appear, I believe this question to be less readily settled by deliberate experimental examination than by an occasional surprising of oneself in the act. To this end I have for several years been noting my own experiences in this connection, and it is these which I would like now to report.¹

(a) Riding in an electric car through the business section of a city, and letting the gaze wander unconstrainedly about, I find myself mentally saying "Nonpareil." A visual image of the word immediately follows and I think of some commodity or machinery which is being advertised. Glancing back, however, I see the name "John Parnell" over the door of the store just passed. Now, to be sure, I had a visual *image* of "Nonpareil," but I certainly had no visual *perception* of it. And, what is more important, the visual image was secondary to the articulatory image.

(b) On the cover of one of the numbers of the PSYCHOLOGICAL BULLETIN stands a title: "A Note on Color Discrimination in the Creek Chub." The last two words I found myself mentally pronouncing "Greek Club," visual imagery immediately following appropriate to the Greek Club of a certain college. Looking back at the title, I saw my error. Here again I am sure that the illusion was not visual. As to whether visual imagery of the two words themselves followed the articulatory imagery in this case, I can make no positive statement. But the point here most particularly and emphatically to be insisted upon is that the illusion-giving imagery is of a modality different from that of the perceptual material arousing it.²

These two cases are entirely typical, and they may for the moment suffice as illustrations. I may add that I have again and again been able to analyze these experiences, and they have been numerous enough and definite enough to convince me that the

¹ Hitherto I have spoken of the proofreader's illusion as if it consisted in correctly reading a wrongly printed word. But the incorrect reading of correctly printed words is, of course, no less in point. An extreme case of the illusion is the reading into the text of a "not," or of any similarly significant particle. Cf. Thorndike, *Elements of Psychology*, p. 230.

² A visual image of the word following upon the articulatory, or auditory, image wrongly aroused by the imperfectly seen print is by no means a universal occurrence. In rapid reading this sequent visual image is unlikely to arise. One gets rather those visual images of objects of situations that are appropriate to the larger promptings of the context. Usually, therefore, the visual character of this illusion is even less prominent than in the first case cited.

usual treatment of the proofreader's illusion is inadequate for my particular case.

Now, in its general features, the experience that the above cited cases illustrate is common enough to every one. What we read differs all too frequently from what stands printed on the page before us. And all that the numerous investigations of the reading process—from that of Erdmann and Dodge to that of Dearborn—have taught us in reference to the perceptive and apperceptive processes involved in this complex of functions serves only to show how thoroughly and how constantly any rapid reader is exposed to illusion. We see in general only the salient or the dominating elements of the word before us, and on the basis of these fragments we apperceive, or believe that we have recognized, the entire word. But our readiness to assimilate these dominating fragments to a wrong set of associates is often just as great as to supplement them correctly. In my own cases, the verbal fragments seen were illusion-bringing because they aroused articulatory factors which the perception of the entire word would not have aroused.

It is of course, in part, the existence of more or less fixed verbal habits which furnishes the prevailing conditions for these illusions. One is driven by the momentum of the foregoing text to utter one word rather than another, whereupon it turns out that the writer has used the other word,—it being naturally a further condition of the illusion that the two words have something in common or have at least about the same length. Thus one reads "through" for "though" and for "thorough"; "parent" for "present"; "such" for "some"; "for two reasons" for "for two seasons"; anything towards which the verbal habits lean when a favoring context is thrown into the balance. But, also, as in all such illusions, the mental trend of the moment may cause an erroneous reading of detached words or phrases. Thus, recently, "Upper Montclair" was read by me as "Upton Sinclair," and "Art Shop" as "Air Ship." But the point which I am especially concerned to make here is that whatever may be the provoking conditions for the erroneous reading, the error lies not in some visual process but in the fact that some variety of non-visual imagery is evoked which fails to correspond to the printed text.¹

¹ In all the numerous detailed discussions incidental to investigations of the reading process—discussions of the apperceptive and assimilative processes, of word recognition, of domineering letters, of the apprehension of words as units, etc., etc.,—there seems to have been rarely a clear recognition of the fact that the visual factors

Suppose, however, that a given reader does not have articulatory, auditory, or other non-visual imagery evoked by the visual perception of words, wherein will his illusion consist? We must, I presume, admit that this type of reader exists, although Huey, who canvassed the question some years ago, while admitting the theoretic possibility of the purely visual reader, writes that in practice he has not met with the type.¹ Granting, however, the existence of the type, we must suppose that the seen fragments of the word arouse a wrong escort of visual images, the resulting visual combination being that which now constitutes the illusion. The illusion is no more *perceptual* in the purely visual type than in the cases analyzed before. It is aroused imagery and not perceptual material which fails to square with reality.

Whether there is something analogous to the proofreader's illusion, in the form analyzed above, in other lines of perceptual activity, I am not altogether sure. Aside from possible similar occurrences when objects, rather than words, are imperfectly seen by the rapidly moving eye, the most likely place for such an illusion would undoubtedly be in the auditory field. And the question to be raised is: Does the ear ever get fragments of words which, instead of being centrally supplemented by the same kind of sense material, arouse immediately those visual, or other non-auditory, images which these same auditory fragments might well excite but which they wrongly arouse in this instance? The question is simple enough, but I cannot be sure that in my own case the conditions are ever satisfied. Here is a case in point. Speaking of an ambitious local politician quite unknown to me, a person says: "They say he wanted to try for the Pope's place." It comes to me as: "They say he wanted to try for *Park's* place." Now while the most prominent feature of this illusory hearing was a visual image of "Park," the auditory and articulatory experiences were so mingled with this that I cannot confidently deny that I had a real and immediate auditory perception of "Park." The probabilities in rapid reading may be relatively subordinate to the auditory or articulatory factors. As far as I can discover, Mesmer (*Arch. f. d. ges. Psychol.*, 2, 279-291) is the only one who has felt the need of appealing strongly to non-visual factors for the explanation of errors. But, so far as I can see, his chief interest was not so much to secure from his subjects introspective analyses of these experiences as to make a classification of the errors of reading in accordance with a prearranged scheme.

¹ See Huey, *Amer. J. of Psychol.*, 12, 297. Cf. also Secor, *Amer. J. of Psychol.*, 11, 225 ff., and Binet, *Année psychologique*, 5, 689. Binet claims that he himself is a purely visual reader.

are that here was an illusion of the commonly recognized variety. Yet I see no reason why any other individual might not find that the essence of his auditory illusions lay in the failure of his non-auditory imagery to square with reality, rather than in some perceptual abnormality.

The appearance of such a form of illusion as I have described is manifestly most readily possible in those sense experiences where the impressions are not of value for their own sake but only as the initiators of imagery or as the starters of motor responses. Now it is the visual experiences that notoriously serve the arousing and initiating functions of every day life, they themselves often remaining in the dimmest fringes of consciousness, while acts performed on the basis of them or meanings gained from them are the consequents attended to. This is to my mind the reason why the form of the proofreader's illusion that I have described is possible at all, and why it is quite possibly the sole case of its kind.

II

But the question forces itself upon one: Is the above analyzed form of the proofreader's illusion in all strictness to be called an illusion at all? Surely it does not conform to the usual type which is commonly illustrated by the mistaking of a hat and coat on a peg for a man. For, in such a case as this, the illusion is entirely *perceptual* in character though only a portion of its elements are peripherally given, while the chief point about the illusions discussed above is that some kind of *imagery* is not what it should be. Whatever fragments of the word are seen are probably seen correctly, but what is seen calls up imagery inappropriate to the actuality of the situation. In a general way the two types of experience may be similarly described. "One *takes* the hat and coat *to be a man*," we say. And just so we may say: "One takes that word *mispirent* to be *misprint*." The functional aspects of the two situations are, it seems to me, quite identical, for they both lead to action on the basis of what the experience is *taken to be*. All we have to do then is to enlarge somewhat our conception of illusion and admit within it the variety that is here concerning us. To distinguish these, however, from the more common variety they may perhaps be called *Imagery Illusions*. And whether such illusions occur elsewhere than in the visual reading of printed words we must leave at present undecided, with a leaning towards the belief that they possibly may not.

III

It is easy to see that what I have called Imagery Illusions differ in a very important practical aspect from illusions that are more strictly perceptual. For they cannot well be subjected to examination. And herein lies the reason, as I believe, for our inability to make them matters of experimentation. Suppose, in general, that one suspect a given experience to have been illusory. How is one to test the suspicion? Obviously by attempting to pass through the same experience again, with a view to its examination. If for some reason one suspect that the perceived man is really only a hat and coat, the experience is sought once more and then critically scrutinized. But in the case of the non-visual form of the proofreader's illusion this deliberate reinstatement is practically impossible. Let me surmise—on the ground, for instance, of incongruity between the present sense and that of the immediately preceding text—that “misprint” is not the actual word of the text. If now I display any care at all in my examination of the form, say “mispirnt,” that does stand there, I direct my attention to the visual field, get a visual perception of what is there, and then find myself pronouncing the misprinted word as it actually stands before me. I simply cannot get the illusion again in this particular case. For its essential conditions are a high speed of visual activity, with the visual factors only marginally present to consciousness. In his chapter on Perception, Professor James recounts how he read “Mt. Auburn” on an electric car which was actually marked “North Avenue.” Suppose now that at the instant some one had raised the challenge: How do you know that you saw “Mt. Auburn”? The only evidence immediately available in such a case would be the visual, or other, image of Mt. Auburn present in consciousness. But to look back and get a *perception* of Mt. Auburn would be quite impossible. Upon reexamining the printed words, the impression would be too complete to arouse misleading imagery of a non-visual variety. And even on the assumption that the peripherally given fragment of the word is centrally supplemented by visual material, as most of the writers on the matter must believe, how pray is this claim to be tested? A critical rereading of the word will give a correct and not an illusory form. To be sure, one may and one frequently does still overlook misprinted words when rereading phrases or sentences. But I am supposing now that the examination is confined to a single suspected word and that the reading is done letter by letter with critical care. If under these circumstances the word is still

misread, it must be because some letter or letters are still so imperfectly seen that the same imagery illusion is experienced in respect to them as was originally experienced in respect to the entire word. The same inability to subject the experience to an examination seems to prevail in all those tachistoscopic investigations of which we have such a multitude of accounts. A given word is said to be seen, though the actual word may have been misprinted or badly mutilated. How may one test the matter to discover what was peripherally seen and what was supplied by central supplementing? The positive after image, or the primary memory image, or whatever it may be called that the subject of the experiment finds in his consciousness, does not of itself reveal its composite character. And though a second exposure of the letter or word may result in giving a different perception, the experience simply cannot be scrutinized with the purpose of testing its possible illusory character.

From these various considerations we gain an important point of view, it seems to me, for the classification of illusions on the basis of their examinability. At least three main classes may be distinguished.

(1) *Illusions which Persist under Critical Examination.*—This class is well illustrated by the majority of spatial illusions. The Zöllner or Müller-Lyer illusions, for example, may be examined and tested as much as one please without annihilating them. They are stable. They persist. Just so with the illusion of Aristotle; with the apparent lessening of a cutaneous linear distance given by a saw-toothed card-edge; and with most of the illusions of auditory localization. This stability rests undoubtedly upon the fact that the perceptual material is in these cases so largely, if not entirely, peripherally given.¹

(2) *Illusions which under Examination Dissolve More or Less Rapidly, the Illusion Becoming Finally Transformed into the True Perception.*—While sitting some years ago in a small German-American church and looking abstractedly towards the pulpit, I suddenly observed that the latter was surrounded in front by a curved sheet of glass with its convexity towards the audience. For some moments I carefully examined this and speculated upon its use in that place, when suddenly the perception resolved itself into that of a tall candle standing immediately in front of the pulpit. Here was partial stability, but the dissolution of the illusion was bound to come. If the hat and coat of the conventional illustration are badly placed, the dissolution of the illusion arrives

¹ These are called "Pure Illusions" by Miss Calkins. See her *Introduction to Psychology*, p. 184.

rapidly. But all grades of stability may be found within this class. I have frequently had the experience of looking for a lake at the foot of a heavily wooded ridge upon the crest of which I was travelling. Illusions of water surfaces were numerous because of the large white birches standing or lying between me and the foot of the ridge. Occasionally when several such birches were scattered about in the field of vision, this illusion resisted for a considerable time all attempts to resolve it, until some peculiar circumstance caught the eye and shattered the illusion. And, to choose a pair of illustrations from the auditory field, the illusion of running water produced by the rustle of poplar leaves in the forest can only be resolved by the trained and experienced ear; while the illusion of voices in the running stream may be much more readily overcome. The resolution of an illusion may involve a nearer approach to the object under survey, or a shifting of the visual angle, or it may be that some quite fortuitous circumstance brings about the collapse of the illusion and its transformation into what can now be seen to possess more "body" and to be more coercive than the previous experience.

In this class, as in class 1, we see that the grade of stability parallels the amount of peripherally given material in the perception.¹

(3) *Illusions which Elude Examination Altogether Just Because any Attempt to Regain the Experience Produces the Correct Experience.*—Here belongs the proofreader's illusion in the form described in this paper. Such an illusion is not subject to critical review. One cannot go back to it, with the intention of testing it, without destroying its illusory character altogether. Here we have the maximum grade of instability, and here the essence of the illusory experience consists of imagery initiated by but not compounded with peripheral elements. These are the *imagery illusions*.

All these classes of illusion are identical in function in that they lead to erroneous motor responses, but it seems worth while to display their structural differences.²

¹ These are called "Mixed Illusions" by Miss Calkins.

² The reader may be reminded of Binet's classification of illusions on the basis of their rectifiability, the latter being accomplished by appeal to another sense than the one conveying the illusion. On this basis Binet distinguishes three types of illusion, the completely rectifiable, the partially rectifiable, and the unrectifiable. (*La rectification des illusions par appel aux sens, Mind*, 1884, 9, pp. 206 ff.) It will be noted that a classification on the basis of examinability sets out from a quite different standpoint. Binet's concern was to describe the various grades of success with which illusions may be banished. The problem of the present paper is in certain respects the reverse of this, to discover, namely, how long an illusion may be retained as such for purposes of inspection.

GENERAL REVIEWS AND SUMMARIES

HISTORICAL CONTRIBUTIONS

BY WOODBRIDGE RILEY

Vassar College

The most important historical contribution, since our last general review, has been J. Mark Baldwin's *History of Psychology*, reviewed in the September number of the BULLETIN. A briefer supplemental account is given in Krueger's article (4) which expounds "the aims and tendencies in psychology," especially in their German-American relations. Thus the first laboratory for experimental psychology was established by Wundt, whose first assistant and coöoperator was Cattell. For the latter the claim is made of holding the first special professorship in psychology in the world. While the United States can boast of a more extensive system of psychological instruction than any other country, with particularly valuable investigations in animal and social psychology, the Germans are not particularly conversant with these facts.

This German-American account is in turn to be supplemented by the French (6).

So much for the general aspects of psychology. For more particular views we take up the study of four eminent thinkers—William James, Fechner, Wundt and Kierkegaard. Knox (3) explains that while James was led on from psychology to philosophy, it was precisely his psychological insight that enabled him to discern the personal sources of the big philosophical antitheses. He was not deterred by a priori distinctions between logic and psychology, by the assumption that our aim is purely impersonal and objective, but held that personal vision and practical make-shifts determine metaphysical theory. He challenged the intellectualist axiom that the parallel lines of knowing and doing must never meet. This makes his *Principles of Psychology* as valuable a handbook of ethics as it is of logic. Thus was early laid in psychology the foundations for the coming pragmatism. And so, conversely, James invites us to treat our moral and religious aspirations as methodologically on a par with scientific categories.

As with James so with Fechner. Angell (1) points out in the case of the German a curious tendency towards a practical mysticism. From the physicist comes forth the philosopher, and the laboratory has given place to the oracle. Believing that the reality of the world must accord with what is reasonable, Fechner saw clearly that this reality could not be deduced by dialectics, but that it must be worked out as one works out final questions in physics, namely by generalization and by analogy. In other words the purpose of Fechner was an inductive metaphysics or "Metaphysik von Unten." Now James, who twenty-five years ago gave his official opinion that the proper psychological outcome of Fechner's work was "just nothing," has made the *amende honorable* in a generously sympathetic essay in the *Pluralistic Universe*.

Meumann's (5) account of the life work of Wilhelm Wundt is noteworthy for two features, its arraignment of German officialdom for its neglect of a great thinker and its praise of American psychologists for spreading the fame of the master. The former fact is explained as due to Wundt's south German independence of bureaucracy, the latter as due to his endeavors to make his work both scientific and practical. To Americans brought up on the old introspective "mental philosophy" the new experimental psychology was a welcome relief. In place of the old static view of the mind came the doctrine of development; in place of the study of the normal adult was offered animal, and child, and race psychology. So what Fechner had started at Leipsic, Wundt enlarged and America spread.

James's pragmatism and Fechner's mysticism had a similar two-fold aspect. Both were scientific and both sought truth under the analogy of the self. So was it with the system of Kierkegaard as his compatriot Hoeffding (2) shows. The Danish thinker's philosophy had a double quality, being both personal and scientific. While subjectivity is the avenue of truth, the world in which we live is a world of scientific approximation. And James's pluralism is matched by the statement that the personal world represents not a world, but a plurality of worlds resulting from the different points of view of personalities. Here arise four chief types: there is the æstheté who draws a tangent to the circle of life along the line of passing pleasures; there is again the ironist who, knowing how to distinguish the interior from the exterior, strives to shelter his inner life against the changes of the moment; there is next the moralist who enters into positive relations with other men

and endeavors to fulfil his duty; there is finally the humorist who, being sadly affected by the contrast of finite and infinite, is forced to look upon life as more or less of a joke. All this reminds one of James's "types of thinking" from the man who "carves out" order to him who considers the universe a vast "grab-bag." Between the American and the Dane there is, then, final agreement in respect to the doctrine of discontinuity, the old idealistic continuity being supplanted by the view that both the psychic and the cosmic life proceed by leaps, *Natura per saltum*.

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GENERAL PROBLEMS; MIND AND BODY

BY WALTER T. MARVIN

Rutgers College

The prominent subjects in the current discussion of the foundations of psychology remain the nature of the mental and the formulation and limitation of the psychologist's problem. The most important contribution to these subjects has been made by Holt (11). His book endeavors to establish two chief conclusions. First, the mental is not a simple stuff which defies analysis and so definition in terms of the non-mental. On the contrary the mental is a complex which can be analyzed; and if so, it must reveal as its components, entities that are relatively simpler and therefore non-mental. Second, cerebral physiology must be freed once and for all "from its present mysterious and retarding association with metaphysics." Cerebral physiology does not raise any problem fundamentally different from those raised by other departments of neural physiology. Yet the traditional belief coming to us through Descartes from the middle ages has so possessed our minds that even our foremost physiologists are "rendered circumspect, tenta-

tive, and, as it were despairing because they cannot hope that their mere physiological methods will avail aught in the cerebrum—the dark throne of mentality.” To return to the first conclusion: Modern logical analysis is forcing us to outgrow that ancient and crude conception of the physical world which pictures it as a cloud of minute Democritean atoms or tennis balls, and is giving us in its place systems of purely mathematical entities, definable in mathematical terms and explicable through mathematical formulæ. Instead of the physical being ultimate, analysis brings us beyond it to that which is logically simpler. Indeed it is this logically simple which constitutes our largest and all inclusive universe of discourse. It is a realm of pure being, for all that is required of any entity in order to be a member of it, is that the entity should *be*, that is, should be a possible object of discourse. It is here in this universe of discourse that logic forces us to begin the work of definition. Starting here we can define the mathematical, the physical and, as Holt endeavors to show, the mental. The mental is a certain selection out of, or cross section of, this realm of pure being, distinguished from other cross sections (for example, the physical) by being that to which the nervous system specifically responds. As members of this larger world of discourse the very same entities can be both physical and mental, and can be within the field of two or more minds. To return to Holt’s second conclusion: The nervous system is simply an organ of response. This is all that the definition of the mental demands of it in the name of psychology. Santayana (14) finds Holt’s metaphysics too Platonic; “it leaves us in the air.” Consciousness is not merely a selection of objects, for attention bestows on the conscious field a “sort of intensity or actuality.” Is not “what the nervous system selects thereby suffused with a specious unity, emphasis, or luminosity which it did not have before?”

Less general than the problem of Holt’s book is the issue raised by the behaviorist. This issue has been discussed by several writers during the past year. Watson (17) in his recent book has repeated his defence of behaviorism.¹ Bode (2, 3) makes the point that if psychology is to be regarded as the science of behavior, “we are bound to reinterpret the category of behavior.” We must distinguish between automatic and conscious acts. “Conscious response is a process of organizing or readjusting different simultaneous responses which interfere with one another.” It is a

¹ Cf. PSYCHOL. BULL., 1914, 11, 1.

response "which seeks and maintains the stimulus necessary for further response." Its characteristic trait is "that stimulus and response develop concomitantly." Adopting this distinction between automatic and conscious response we may accept behaviorism. Crile (7) argues that granted the mechanistic theory of life psychology must be redefined. It is the study of how in the course of man's phylogeny and ontogeny his responses have become determined by environmental stimuli. The evidence afforded by the reflex arcs in man shows clearly that environment is indeed the author of his mental nature. Frost (9, 10) argues that "if no process can experience itself, be within itself both subject and object" there exist no grounds for labelling any process "psychic." Neural arcs never respond to themselves but to stimuli from without the body or to neural impulses passed on from lower arcs. Psychology gains nothing by speaking either of an elementary psychic process or even of a knowing function, for it can express in a better way "the reactions or awarenesses" on the part of higher neural processes of lower neural processes. Against the extreme behaviorism of Watson and others Marshall (12) protests that though there is without question and of right a science of behavior, still there are existences of another order than the physical order, the mental order, and "from time immemorial it has seemed worth while to some of the most powerful thinkers among men to investigate the nature of, and the relations between, these existences in the mental order." Dewey (8) discusses the relation of psychology and philosophy and expresses a certain hope and a certain fear regarding the behaviorist movement. Our present psychology is not founded solely upon matter of fact, for it has inherited from the Middle Ages through Descartes and Locke a general theory. It is now outgrowing this theory and already many of its developments "decline to lend themselves to the traditional rubrics." Given a generation of teachers and students trained in the behaviorist point of view, the change from the introspectionist psychology will profoundly change the spirit and tenor of philosophical discussion, chiefly by relegating some "problems to the attic in which are kept the relics of former intellectual bad taste." But behavior must not be limited to the activities of the nervous system, for behavior "would seem to be as wide as the doings and sufferings of a human being." The distinction between routine and whimsical and intelligent—or aimful—behavior would seem to describe a genuine distinction in ways of behaving. Again we should not

ignore the social qualities of behavior. In short, behaviorism must break loose from its prepossession that behavior is solely something going on within an organism and take behavior as it is found.

The nature and field of psychological science are discussed also in articles by Creighton, Natorp, and Sauerbeck. Creighton (6) protests that the primary psychological interest is not that which is sought in physiological psychology. Rather it is that which "seeks to understand *individuals*, our own mind and that of others; and to understand individuals is to know them from the inside as centers of experience," for the person is not a series of phenomena but an individual, a self. We must study the mind not by the analytical and abstract methods of science but through an insight into the concrete form of the mind, the living mind as it is presupposed in most of our concrete dealing with our fellow men, and in our explanation of history. "The life of mind is a realm of judgment, value and appreciation, a life of activity and interpretation." Closely related to this conception of psychology is that of Natorp (13), who would carry psychology way beyond its limited field as one of the special sciences and offer it as its province the whole realm of life and life's interests. Sauerbeck (15) finds, over and above the differences in the objects studied by the several existential sciences, differences in method. Psychology stands out from the other sciences by having in addition to their methods one peculiar to itself, namely, the teleological method. This method is indeed in many respects an imperfect one and becomes scientific only in combination with the other methods, which are respectively, the methods of exact science, the empirical or descriptive method, and the historical or evolutionary method.

The mind-body problem is the subject of the presidential address by Warren (16). Though science is not yet ready to adopt a metaphysics of mind and matter, "some working hypothesis of the psychoneural relation is needed." "The double aspect view (monodualism) seems to fit the conditions best." For this view Warren finds an interesting and apposite analogy in the surface-mass relation of a material body. "Mass and surface change conjointly; they are inseparably bound together; they are two radically distinct aspects of the same thing." If the mental and the physical are two aspects of the same thing then it follows that the uniformity found in the physical obtains equally in the mental sphere. Human volition and human reasoning and teleology can be explained quite in accord with the mechanistic processes of

nature. The double-aspect theory has also an important bearing upon the issue raised by behaviorism. "Psychology should embrace both the inner and the outer aspects of experience." The relations between the individual and his environment can be studied objectively as behavior, or introspectively as consciousness. On the one hand, the study of behavior checks up the data of introspection and is essential to the understanding of genesis; but on the other hand, introspection "has disclosed uniformities among mental events," and the conscious life, that introspection reveals, requires scientific analysis and study as much as the objective world revealed by consciousness.

Further studies of the mind-body relation are those of Bleuler, Dürr, and Carr. Bleuler (1) concludes that the laws of the central nervous system and of the mental stream are identical and so that there is no fundamental difference between psychical and physical causation. The differences usually noted are not differences between psychical and physical causation but those between simple and complex and between direct and releasing causation. The releasing and blocking of reaction in the mental field is to be conceived of as a process analogous to the switching of an electrical current or rather as the lessening or increasing of resistance to the passage of the current at a switching point. A new unaltered edition of Busse's book (4) has appeared with an appendix by Dürr in which he gives an elaborate analysis of the mind-body problem and expresses his decision in favor of interaction as this doctrine is formulated in his analysis. Finally Carr (5) gives two reasons why the mind cannot be produced by the brain. "One is that it is impossible to explain anything as an effect unless we can regard it as strictly commensurate with the cause, and mind is not commensurate with cerebral process. And the second is that the consciousness which arises in connection with cerebral process is not consciousness of cerebral process but of something which is altogether independent of cerebral process, something existing in a different space" and time.

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CONSCIOUSNESS AND THE UNCONSCIOUS

BY H. W. CHASE

University of North Carolina

More and more dissatisfaction is becoming evident with the traditional attitudes toward consciousness. Watson (18) restates in the first chapter of his book the position taken in his papers of last year, and presents an imposing array of facts which the behavior method has yielded in the field of animal psychology. Frost (6, 7) pleads for a use of the term "awareness" with a physiological, rather than with its usual mental, connotation. When, for example, the pupillary reflex takes place, we may consider that the eye-mechanism is aware of the stimulus. When the activity of such lower arcs leads to the stimulation of higher arcs, the latter may be said to become aware of the former. Such physiological processes are themselves "consciousness at the moment, completely described." There is no necessity of assuming an additional

realm of psychic realities, though, to be sure, the psychologist may still continue to use his old terminology, and to speak, for example, of sensations, which are not, however, to be regarded as first, but second, things in the way of consciousness. The paper of Burrow (1) advocates the similar thesis that the "mind is the function of the body-complex presented in the reaction of the individual as a whole." In order for psychic states to arise there must be a synthesis of two or more stimuli into a simultaneous unitary reaction. Such reactions do not cause, but are themselves, consciousness.

Dewey (3), speaking as a teacher of philosophy, deplores the fact that the student of philosophy comes to his work with a belief in a distinct psychic realm of existence, unique and private. That such a condition of affairs exists is due to the philosophy of Locke and Descartes, which is not yet outgrown by psychology, though long ago discarded by the philosopher. If the behavior psychology in its extreme form were to prevail, the case would, so far as the teacher of philosophy is concerned, be little better, since the behaviorist is no less dominated by dualism than is the introspectionist. Carr (4) takes a radically different view. For him, mental and physical are absolutely incommensurable. Mind and brain touch at one point only, like the circle and its tangent. But Warren's paper (17), taken in conjunction with those noted above, shows that Dewey's criticisms of the position of psychology in general are not applicable to the views of all psychologists. Consciousness and the nervous system constitute, for Warren, a single series of processes, "observable in two ways." Mind is not an epiphenomenon, but all organic life presents a "double aspect." For the mental side attaching to the functioning of the lower centers and to the activities of the simpler organisms, he suggests the term "protoesthesia." Such a double aspect view allows psychology to adopt mechanistic views, and provides a place for the study of behavior while not ruling out introspection. Psychology then becomes the "science of individual experience," regarded from both points of view. Hobhouse (8) is equally convinced that physical and mental cannot be sharply set off against each other. Consciousness is too narrow a term to serve the student of mental evolution; it is better to speak of "correlations," including all sorts of vital activity. The lower organisms make their correlations in terms of present factors only. Gradually these develop in such a way as to make possible correlations with factors not immediately present. Such complex types of correlation are just

what we mean by mind. The mental universe, at first incoherent and confused, is reduced to logic and order under their influence. Mind in this sense is a real factor in evolution, though not the only one.

The most thoroughgoing treatment of the problem of consciousness from the philosophical point of view is the work of Holt (9). In his system we are presented with a universe made up of "neutral entities," which themselves are neither mind nor matter, but the possibility of both; a universe derived deductively from pure, empty Being. Mind is not the basal stuff of the universe, for it is too concrete and limited. Our ideas are said to "represent" objects. But representation means at least partial identity; if it were adequate, identity would be complete. It is incorrect to say that we are conscious of objects; in so far as representations are adequate, consciousness and its objects are identical. Consciousness is simply a particular complex of objects which themselves are neutral, a sort of grouping which is one of a series into which objects may enter, and which are generated deductively, the more complex from the simpler, the universe being a "single deductive system." Objects—and the term includes all sorts of qualities, relations, pleasantnesses and unpleasantnesses, and so on—are precisely the same whether they appear as consciousness or in any other way. They become consciousness through the activity of the nervous system, which responds to qualities usually regarded as subjective and abstract, but which are really neutral, as well as to "physical" stimuli. Such a consciousness is of course without an abiding principle of unity, as well as without that privacy which we have been accustomed to associate with it.

Santayana (13) feels that we have in such a conception the coming philosophy, though not one which is coming to stay. After all, the realist does make a distinction between consciousness and its objects, since he assumes that they are selected and formed into individual groupings by the nervous system; unless, to be sure, he assumes that consciousness is the primal stuff of the universe, in which case he finds himself back in idealism.

MacDougall (11) reminds us that the interpretation of physical changes in terms of mind presents difficulty even in the normal adult. The same stimulus may or may not become conscious at different times, the same movement may or may not involve the higher centers. Even in man the question must always be answered in terms of the whole situation. The same problem is met in a

more acute form in abnormal and immature individuals, and in the animal series. Four criteria of the presence of consciousness have been proposed. Mind may be regarded as co-extensive with matter; as present only when complexity of structure has reached a given point; as indicated by complex or modifiable behavior; as attending imperfect adaptation. In attempts to apply such criteria a careful distinction must be drawn between consciousness as a unity and as a complex of phenomena. The latter view is that of science in general, and should determine the statement of the problem. We should inquire not about the distribution of consciousness as a formal unity, but about the appearance of the several mental factors.

Feingold's paper (4) is an attempt to demonstrate experimentally the sort of environment that is fittest for the continuity of consciousness. Groups of postcards were exposed to ten subjects. Certain of these cards had already been graded in terms of similarity, and each exposed group contained one such standardized card, these being exchanged from group to group, and the observers required to note substitutions. The results showed that "an environment which is a mixture of about 30 per cent. homogeneity and 70 per cent. heterogeneity is the most ideal environment for the continuity of consciousness."

Turró (14), in an interesting book, works out in detail his theory that consciousness develops in the individual, not in response to external sensory stimuli alone, but primarily under the influence of hunger, which, when satisfied, gives rise to trophic or internal sensibility, itself in turn potent in the early stages of mental development.

The most important contribution of the year to the discussion of the subconscious is the book by Prince (12). Its title is somewhat misleading, since the author restricts in practice his definition of the unconscious to include only latent neural dispositions. Such "neurograms," when stimulated, may give rise to processes which are conscious or subconscious. The latter again may be purely physiological, or may be correlated with psychic, though not conscious, factors. Such co-conscious processes may include "true perceptions, memories, thoughts, volitions, imagination, etc." Conserved experiences may undergo subconsciously the greatest elaboration and systematization, get organized into complexes, enter into the mechanism of our conscious thought, determine meanings, give rise to convictions, attitudes, visions, dreams,

obsessions, phobias, dissociations of personality, conflicts, and so on. Many examples of the functioning of such processes are given, for the most part from the author's own rich clinical experience. The Freudian school comes in for its share of criticism, while some of its conceptions, notably that of the possibility of a rational interpretation of dreams, are in principle accepted.

Freud (5) sums up his now familiar theory of the unconscious. Studies of hypnotic phenomena prepared the way for dynamic theories of the unconscious. The paper of Jelgersma (10) is also a discussion of Freud's theory of the unconscious, with particular reference to dreams. Troland (15) applies the same conceptions to psychical research. Those who hold, as does Freud, that the subconscious is immoral, possessed of brute cunning and a perfect memory, will naturally see in telepathy, spiritism, and the whole range of veridical phenomena, manifestations of its activity. This view is applied to the discussion of typical phenomena. Wanke (16) feels that a psychology which does not take account of subconscious phenomena must always remain incomplete.

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DREAMS

BY ELIOTT PARK FROST

University of Tennessee

Bergson's original lecture upon the subject of Dreams (March 1901) has found a translator and appears now in book form (2). Written a few months after the publication of Freud's *Traumdeutung*, this essay of Bergson's possesses mild historic interest, and the eminent name upon the binding will insure readers, but no essential contribution is here made either to fact or concept. Such a naïve statement, for instance, as that "in a few seconds a dream can present to us a series of events which will occupy, in the waking state, entire days," exposes the data of the book to suspicion.

To infer from the bulk of recent literature on the Dream, dreaming is distinctly in vogue. Those who brave Freudian analyses are busily concerned in codifying their dream life. Most current books and brochures do not remain neutral, but deduce conclusions frankly either in support or condemnation of Freud. Supporting articles take the form, for the most part, of further dream analyses; while those who take issue with Freud do so both upon logical grounds (5) and upon the basis of experiment (3, 13).

Four important books of the last year or so have reference to dream experience. The new edition of Coriat's *Abnormal Psychology* (6) devotes three complete chapters and much other discussion to sleep and dream problems. Hitschmann's monograph (8) gives a summary of the Freudian viewpoint with one chapter devoted to the Dream. Brill's translation of the third German edition of *Die Traumdeutung* (4) now puts this material, first hand, before the English reader. Finally, Prince's fascinating book, *The Unconscious* (13), has a wealth of dream material, with emphasis upon non-Freudian factors.

A few dream studies are of the questionnaire or statistical sort; others give the results of investigation of dreams personally experienced. Among the former, Terman and Hocking (14) investi-

gated the sleep of 2,692 school children from six to twenty years of age. They found surprising lack of correlation between the amount and character of sleep and dreams, on the one hand, and either school success or nervous traits on the other. Check experiments upon abnormal subjects gave similarly negative results (14, 15). With five subjects Thompson (16) finds that dream imagery is similar both in character and intensity to that of waking life; that sensory stimuli do not cause the dream, playing only a minor rôle in its formation; that condensations occur more frequently in visual than in auditory material and, in general, occur most often in terms of the predominant imagery of the subject experiencing them. Finally he claims that critical thought and reasoning may and do occur in the dream, though rarely. When such higher processes take place they exhibit all the clearness and logical consistency of waking trains of thought.

Klages (9) publishes the first of several promised voluminous speculations as to the character of dream material and its mutual relations with waking consciousness. It would appear that there is abundant supply of this sort of stuff already at hand without the new infliction. After all as Bergson writes: "We need something more than theories. We need an intimate contact with facts. One must make the decisive experiment upon oneself." Considerable work of this sort has been accomplished. Aall (1) agrees that dreams may possess entire consistency within themselves and yet not be consistent if viewed reflectively upon waking. For him the dream is often actually motivated by physical stimuli, in certain types of dreams usually so, for instance auditory dreams are occasioned by genuine sound stimuli. Such stimuli are no more disturbing to sleeping than to waking consciousness, but for the former there is no check or norm: this occasions the frequently intense and hallucinatory character of the dream.

Köhler (11) cites a dream of intense religious feeling aroused while the dreamer is describing a musical composition. The significant thing here is that while the ideas and feelings which the music expresses arouse religious ecstasy, there are no auditory images. Incidentally, the Freudian wish-fulfilment interpretation is discredited as a universal principle of explanation. In a more extended investigation of his own dreams elsewhere (10) he concludes that where sense data are complex, its imagery rarely occurs in the dream. Reading and writing, for instance, require for their adequate performance integrations of various diverse

mechanisms, and in consequence dream images of these acts are rare and imperfect. Dreams of a given night show many interrelations, but usually all possess an hallucinatory character. He agrees with Frost (7) that between dreams involving total change of scene, there is never an absolute gap, but some traceable thread of association remains. Finally, for him, dream and waking affective processes are essentially of one sort and not two. Feelings, that is, as they appear in the dream, are real feelings and not merely images of feelings.

Frost (7) finds a characteristic dream-form, which if graphically represented would take the shape of a pulse- or breathing curve, *i.e.*, a given dream episode is launched abruptly and full-blown, but begins promptly to undergo disintegration and condensation, leaving a final trace only to act as occasion for the following phase or episode. However irrelevant the second phase or dream, and however great the apparent gap between the sections, some nexus of imagery or word was invariably discoverable. Further it sometimes happens that an emotion or affective process, for example a fear, may persist through several episodes, coloring them all. In such cases there is likely to be an affective summation: the feeling eventually awaking the sleeper. Finally, with condensation, meaning values change, and what was originally important becomes inconsequential.

Kollarits (12) also finds fear an important factor in dream determination. With the insistence of Freudians upon their sex symbolism, he does not agree, accusing them in substance of the psychologist's fallacy: their wish is father to their thought, and not their dream! He believes, indeed, that dreams may be the realization of both wishes and fears, of both the conscious and unconscious variety, but he insists that dreams frequently occur that cannot be explained as either, but are quite indifferent: a view held by the majority of Freud's critics. Berguer (3) from a dream analysis of his own suggests that some at least of the disguises of the dream may not be the conceptually motivated repressions of a censor, but may be due rather to what he terms a verbal jumbling: to the manner rather than the matter of dream expression. Even if the dream comes, as do his, in terms of verbal imagery, as though the dreamer were either speaker or audience, and so became liable to confusion in expression, it does not appear why the Freudian factors may not also be present.

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INTROSPECTION AND GENERAL METHODS

BY CHARLES H. TOLL

Amherst College

The articles assigned to this rubric are of widely various content. Discussing the method of introspection, Bode (4) argues that analytic observation necessarily alters the experience it was intended to observe. "Mental states" are fictions, and introspection cannot possibly consist in the discovery of elements of mental states. But "the legitimate purpose of the analysis is to furnish, not only a new experience of the situation in which the earlier experience occurred, but an experience of such a kind as to reveal the causes or conditions which were then involved, but which did not constitute a part of the experiential content" (p. 89). Also the uniqueness of an experience is best apprehended only after a

later, reconstructing experience in which some of the original aspects have been further developed.

Working with introspections of the meaning of words, and later of aphorisms, Ogden (7) found that although his four observers were able to take the desired attitude in the case of the meanings of words, giving a truly psychological description of the content of the experience, they were practically unable to do this in the case of the aphorisms, but lapsed into information about logical meanings. He concludes "the method of studying the thought-process by the arousal of complicated experiences is unsuited to a description of content" (p. 407), though it does furnish data on "thought-relations and their dependence on associations" (p. 411).

Replying to attacks against certain studies which used "the method of examination." Titchener (10) maintains the value of the results obtained, and, while he admits "it does not appear that the method of questions will ever avail, of itself, to settle disputed questions of a systematic kind" (p. 436) and can hardly be given "a rank with the approved methods of the science," he still asserts its value for obtaining a first survey of new fields and also incidentally as an educator for students.

The possibility of getting reliable introspections from dementia precox patients was studied by Boring (5) with eight such subjects, who learned a maze; control data were obtained from three university subjects, and from two twelve-year old boys. After discussing the various criteria of reliability, and his method of grading the data, he concludes that the reports of these insane patients are "of about that degree of reliability that is found in reports made by untrained observers with little education and a poor command of language, and appear to differ from these reports in no characteristic way other than in the introduction of irrelevant material" (p. 170). But he also says that at least seven of the eight dementia precox patients were also "uneducated men with very poor vocabularies" (p. 157).

Baade (1) found it possible to obtain valuable, immediate introspections upon interrupting an occasional one of a series of experiences, using preferably a visual signal, which was variously timed by the position of a lever in the path of a pendulum released as the experience began. He also (2) tried a dictation-phonograph for recording introspections, but found that, even with such refinements as a speaking-trumpet for a mouth-piece, the practical utility was slight.

Read (8) considers the comparative method is always "to construct or confirm an elaborate hypothesis concerning a series of antecedents that have been lost" (p. 48), thus discovering the probable causes of observed modifications. Application of the method to psychology is chiefly hindered by present ignorance of the stages of mental development of the various animals, and consequent uncertainty as to what cases may allowably be used as parallels.

To determine how far the preference for certain numbers operates to produce errors in estimating small fractions, Bauch (3) obtained series of estimates of tenths of a millimeter on a micrometer-like apparatus, and also estimates of fractions of a decimeter in centimeters and millimeters. All of his ten subjects showed errors of the same type, and he found that in careful estimates of such small fractions, when equal numbers of each tenth are actually given, the "border tenths,"—1, 2, 8, 9, 0—are judged about 15 per cent. more often than they are given. However, when the estimate is a rough one, approaching a guess, the preference is for 0, 5, 8, 2, in this order. And in wholly free choice of a decimal, the border decimals are less frequently chosen than the others. A tentative explanation of the first conclusion is suggested.

Lyon (6) reports a simple method of scoring repeated lists of three-letter syllables and words.

Schwartz's article (9) is something of a curiosity. The problems of psychology are ultimately the problems of physiological mechanics; for all mechanics the calculus should be replaced by "a system of relative values," which would allow a mathematical formulation of the relation between idea and object. From the original proportion "object : idea :: stimulus : sensation" one can derive the equation "object \times sensation = idea \times stimulus."

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BIBLIOGRAPHICAL

BY HOWARD C. WARREN

Princeton University

The general psychological bibliography compiled by *Psiche* (1) was completed in the second volume of the magazine. The topics included in the later installments are religious, legal, and social psychology, psychotherapy, and comparative psychology. On the whole this bibliography is disappointing. As a reference list for the beginner these selected titles with brief analyses of contents have some value, but the works included are neither numerous enough nor chosen with sufficient care to afford assistance to the average psychologist. Social psychology includes only 64 titles and animal psychology 133. Of greater value to the worker in psychology is the annual philosophical bibliography published by the *Rivista di Filosofia* (5). The list for 1912 includes 94 titles in psychology, all Italian works. Some of the references are not readily obtainable from other sources.

Several bibliographies on broad general topics have recently appeared. Among these Berguer's list (2) of about 1,300 titles on religious psychology deserves especial notice on account of the thorough way in which it covers the field. The titles are largely of works published within the past decade, but there is no time limit and we note several references earlier than the nineteenth century. Attention should also be called to the report of literature covering the whole field of psychiatry, published annually by the *Allgemeine Zeitschrift für Psychiatrie* (6).

Doll (3) gives a well-selected list of about 150 titles on feeble-mindedness and kindred topics, which should prove particularly useful to psychologists working on retardation and mental tests. Important works are starred. Kohs (4) gives 254 titles of books and articles dealing with the Binet-Simon scale. The contents of the more important works are mentioned in brief notes, which enhance the value of this list considerably for reference purposes.

Titchener and Foster (7) in two further supplementary lists bring their bibliography of Wundt's writings down to 1913, including part of 1914.

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APPARATUS

BY C. E. SEASHORE

University of Iowa

Black (1) recommends the use of a miniature electric lamp in the color capsule of the McHardy perimeter. "With the electric perimeter absolute spectral colors are used," is an expression which shows the author's conception of the physics and psycho-physics of the problem. He says nothing about how to produce these "absolute spectral colors."

The rather elaborate and cumbersome æsthesiometer described by Gemelli (2) is probably more complicated than necessary.

Lubmann (3) gives an illustration of the naïve attitude of the aurists toward the measurement of hearing ability. The aurometer is a watch suspended on a graduated bar attached to head band, all of which is much worse than the mere holding of the watch in the hand.

The apparatus described by Dunlap (4) for the measuring of slow reaction times consists of "(a) an Ewald chronoscope, (b) a 54 dv. electric fork with two mercury contacts, (c) two voice keys somewhat similar to the 'Schallschlüssel nach Roemer,' but simpler, (d) a double relay of my own design, and (e) a master switch, which I designed for general purposes, but which has not been described

in detail." The Ewald chronoscope now on the market and here recommended is much superior to the one that was on the market twenty years ago. The reviewer has found it to be by far the best of the small and relatively cheap devices for time measurement.

Snyder (5) sums up his description of certain technical devices and procedures for the equipment and operation of a thread-galvanometer as follows: "A description is given of a simple and perfectly safe disposition of the parts and wiring of an inexpensive main switch-board. Certain modifications of Edelmann's photo-registration drum are briefly described which enable one to use it for both slow and fast speeds. The velocity of the camera-drum may thus be varied at will from 4 mm. to 2 meters per second. A combined automatic breaking key and photo-stimulation signal is described which may be attached to the photo-registration drum. The above devices have been used successfully, and thus at comparatively small expense, with the small electro-magnet thread galvanometer, Edelmann construction."

Those who are interested in the installment or the adaptation of apparatus for use of spectral colors in laboratory and clinical work will find very helpful suggestions from Trendelenburg's account (6) of the simple and serviceable arrangement designed by von Kries.

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TEXT-BOOKS AND GENERAL TREATISES

BY HERBERT SIDNEY LANGFELD

Harvard University

The year has been rich in text-books and introductions. Watson's *Introduction to Comparative Psychology* (14) is probably the best text-book of animal psychology that has yet been written. Its usefulness is not, however, limited to that field, and it will,

without doubt, be welcomed by all psychologists who are at all interested in an objective psychology. In the opening chapter the author states his objection to introspective psychology, and outlines clearly his behavioristic program. He says that "psychology, as the behaviorist views it, is a purely objective, experimental branch of natural science which needs introspection as little as do the sciences of chemistry and physics."

A chapter at the beginning is devoted to a sketch of possible problems. Experiments in instinct and habit more than any others are in need of careful field observations. A long chapter is devoted to methods, and contains illustrations and descriptions of the latest and most promising apparatus. In the section on instinct much material is drawn from the author's most interesting work upon the noddy and sooty terns. The several theories as to the origin of diversities are presented in a most intelligible form. Next follow several chapters dealing extensively with habit and the learning processes. This part ends with a description of the clever horses which aroused so much discussion in recent years. Language habits form a distinction between man and beast and this subject occupies a short chapter. The author remarks that "it is futile to search for imagery and reasoning in animals, but scientists might well investigate the possible development of the language habit in the anthropoids." The last part of the book is devoted to experiments in the different sensations. In all the fields treated in the Introduction the most important experiments are briefly but clearly described. The chapters are supplied with short, well selected bibliographies.

Professor Münsterberg's psychology (9) is original not only in many of the ideas which it contains but in the extensive field it covers and the arrangement of the material presented. The conventional scope of the text-book is covered by the first half of the book. This deals with the individual processes both simple and complex, and is preceded by a chapter on the fundamental philosophical principles. The book continues with the elementary and complex processes of the social group. Thus far the explanation has been a causal one. Although the mental is non-spacial and admits of no causal relation, yet psychophysical parallelism allows us to explain mental facts by means of physiological processes. There is, however, another treatment possible. Man is moved by motives. There is the realm of values where a teleological explanation is applicable. A description of mind from this point of view is

given in the second part of the book which is called "Purposive Psychology." The third part is on "Applied Psychology" and includes educational, legal, economic, medical, and cultural psychology. The book is intended for an elementary course; the subject is broadly treated, and every aspect is presented to the student in as clear and interesting a manner as possible. It is a book not only for the teacher, but for all who desire a concise account of the author's views on all the problems of his science.

Ogden (10) has felt the need of a book that would enable the student "to connect his psychology with every day life and . . . to apprehend the bearing of his science upon philosophy, education, sociology, and biology." He also thinks that we should incorporate in our psychological system the more recent findings of the thought process experiments. In consideration of the first need the author has mentioned only the most important facts and in the simplest possible language. There is no physiology, psychophysics, or reference to laboratory work. Few theories are discussed, nor are references given except a short list of books for additional reading. Consistent with the second part we find frequent mention of the imageless contents of mind. Like Münsterberg's book, we find a purposive as well as a causal point of view. So many topics are treated in this rather short book that each can be given only a very small space. In the analytical part we find sensation, image, affection, and thought treated; in the synthetic section attention, memory, perception, ideation, reaction and emotion. The last part of the book, under the title of the "Issues of Psychology," deals with the directive tendencies of mind, the relation of mind and body, personality, which includes the ego, dreams, hypnotism, telepathy, insanity, etc., and character, which includes the logical, esthetic, moral and religious character.

Messer's psychology (8) is principally descriptive in the strict sense of the word. Most of the book consists of data obtained from the direct observation of conscious processes. That which is given indirectly comes for the author under the head of explanation. There is only the merest reference to physiology and little to physiological psychology. Much attention is given to definitions and there is an extensive historical background. The attitude towards existing theories is for the most part conservative and many problems are recognized as being still unsolved. The author does not attempt to be original nor has he a system to present. One of the chief values of the book is the excellent idea it gives of

the most promising work of the younger generation of German psychologists. The book is distinctively German psychology; and as in the case of any scientific book which almost totally neglects or deprecatingly pushes aside foreign production, it bears a provincial stamp.

The author begins with an account of the chief sources of the science: the practical knowledge of human motives, religious belief and the biological explanations of life. There is also an historical sketch of the principal problems such as apperception. The methods of psychology have been the analytically descriptive, the experimental, and the Würzburg method, which is a combination of the first two. Unconscious mental processes such as dispositions are admitted and considered of much importance as a means of explanation.

It is interesting to note that one of the first of the Würzburg school advocates a combination of the introspective and objective methods. An instance of the neglect of foreign literature is the remark that it is generally admitted that feelings can be observed. Against sensationalism it is contended that experiences such as judging and willing cannot be explained from a sensational basis. The description of sensations occupies little space, much attention being given to Katz's work on color and Köhler's on tone. In the explanatory part such facts as the Purkinje phenomenon, contrast, thresholds, and theories are included. The psychophysical methods are briefly treated. Images are called centrally aroused sensations. There is a good account of synesthesia and its theories. In the treatment of perception, which for the author contains a conceptual element, he cannot avoid some epistemology. In the interesting discussion of size and form there are frequent references to Bühler's work on space and Wertheimer's recent experiments on subjective movement. The controversy between a genetic and a nativistic theory of space belongs to child psychology. In the adult's consciousness space is directly given. In discussions of the categories such as identity, causality, concept, and judgment there is much attention devoted to the psychology of logic. Memory and recognition have extensive treatment. Attention is rather an attribute of the ego than a conscious concept. The qualities of feeling and emotion are discussed at length and methods of experimentation given. A chapter is devoted to judgments of value. An account of the will act is given according to Meumann and Ach. The description of the thought processes, which includes

attitude and determining tendency, is valuable. In the chapter on mind and body it is suggested that a careful examination of the records of the Society for Psychical Research should be made in reference to the question of the future life.

Kleinپeter (4) as he himself remarks is his *Einführung* is strongly influenced by Mach, according to whom knowledge of the inner and outer world is gained from our mental experiences. It is this idea of thus constructing our universe that has guided the author in planning his book. It cannot be looked upon as a text-book, although the author had also a pedagogical purpose in mind. There are many facts which are very clearly presented, but few theories. Experimentation is very prominently considered. A proper balance between epistemological discussion and psychology has been sought. The book is too ambitious to be thorough and the best judgment has not always been used in the selection of material presented. From this interesting little book of about four hundred pages which includes fundamental principles, all the sensations together with descriptions of instruments, reproductions of curves, and methods of experimentation, Fechner's law, the feelings, will, reactions, associations, measurement of mental work, attention, animal psychology, individual psychology, and genetic psychology, it is impossible for the reader to get more than a few suggestions. An exception might be made in regard to the nervous system which curiously enough occupies sixty pages and comes after sensation, which occupies only fifty. There is evidence of a very uneven knowledge of the more recent work, although almost every subject is introduced by a short historical survey.

Rey's book (11) is intended as a preparation for the baccalaureat examination and as an introduction to psychology and philosophy. It is somewhat more than an outline of his course. The first part is devoted to psychology and philosophy between which no sharp line is drawn. The second half to æsthetics, logic and ethics. The book can interest an English reader only in that it gives him an idea of the nature of such a course and the method of instruction in a French university.

Two outlines for psychological experiments have appeared. Hollingworth's book (3) outlines a series of experiments, seventy in number. They presuppose lectures on the several topics and both a general and detailed outline is given for such a course. The book is for the student, who will have to be assisted by the instructor. Most of the experiments require very inexpensive

material. Each topic is introduced by a short discussion, and the experiments are followed by references. There is a special aim to interest the student and to keep him in touch with every-day life. This will be noticed in the arrangement of the book, which differs from most of those previously written in that it begins with the more complex processes such as practice and transfer, as illustrated in the cancellation and puzzle tests, a few of the well-known experiments on the sensations coming near the end of the book. There are also experiments on fatigue, reaction, memory, imagery, attention, judgments, etc.

Breitwieser's little book (1) is in the nature of a primer. The experiments are very briefly described, at times too briefly. For example, instead of merely stating for the materials under one experiment "various taste solutions" and under another "odor solutions" several solutions should have been specifically named. There is a very elementary account of statistical methods and another of the nervous system. Of the 187 pages 33 are blank pages for notes. The experiments, which include those on the sensations, perceptions, attention, reaction time, imagination, memory, and affections, have, as the author acknowledges, been gathered from the works of many authors, the chief sources being Titchener, Myers, Seashore, Witmer, and Sanford.

Several new editions have also been published. Calkins (2) has continued the excellent plan followed in the previous edition of her book of noting in the preface with the page numbers all the changes made. We find that there have been a number of minor changes and two vital alterations. The most important are those undertaken in order to make her system entirely consistent with her concept of psychology as a science of self. The fact is therefore emphasized that the structural elements of consciousness, sensations, feelings, and relations, are forms of the relation of self to its objects. According to this, it is suggested that the expressions, "visual qualities" and "auditory qualities" should be changed to "seeing colors" and "hearing tones." A similar change may be noted in the discussion of the will. The statement that structural elements may be regarded as impersonal is now omitted. Another interesting change is the placing of the consciousness of realness among the relational elements of consciousness instead of classifying it with the affective elements.

In the second edition of Major's text-book (6) the arrangement of some of the topics has been altered, paragraphs have been re-

written and new ones added. The book, however, covers the same number of pages as before. Among the additions might be mentioned a paragraph upon the popular views of attention, and a note, evidently referring to the behaviorists, which states that "it is doubtful whether their (animals') sensory and perceptual processes resemble those of human beings as much as most persons nowadays suppose."

Finally attention should be called to the following three books. A splendid book of general interest is that of Kostyleff (5), the translator of Bechterew's *Psychologie Objective* into French. He has carried out the idea of Bechterew of explaining the mental life in terms of cerebral reflexes by applying this method in detail to the thought processes. One's curiosity is at once aroused, for the three principal sources of his material could hardly be more widely apart in their tendencies; the Bechterew-Pavlow group, the Würzburg school and the school of Freud. The book should appeal to a very large circle of readers including psychologists, psychopathologists and those interested in æsthetics. Especially at this time of vigorous discussions concerning an objective psychology the book is very opportune. In the chapter on the mechanism of ideation the introspective data is taken from the works of Watt, Messer, Bühler, etc. In the chapters on the data from the unconscious, dreams, and imagination, the Freudian school is most prominent. Almost half the book is devoted to an analysis and explanation of æsthetic productions. There are chapters upon the poetic inspiration, the mechanism of a poetic genius, and upon the inspiration in the novel.

The sixth report of the Kongress für Experimentelle Psychologie (12) has appeared in two volumes, the first part containing the reports presented at the meetings, the second the discussion and the special summaries which latter include a thorough summary by Klemm, "Über die Lokalization von Schallreizen," one by Gutzmann, "Über die Beziehung der Gemütsbewegungen und Gefühle zu Störungen der Sprache," and a third by Stumpf "Über neuere Untersuchungen zur Tonlehre."

A collection of the psychological writings of Meinong (7), many of which have been difficult to obtain, has been edited by his pupils. The titles are: "Hume-Studien," "Über Sinnesermüdung im Bereiche des Weberschen Gesetzes," "Über Begriff und Eigenschaften der Empfindung," "Phantasie-Vorstellung und

Phantasie," "Zur Psychologie der Komplexionen und Relationen," "Beiträge zur Theorie der psychischen Analyse," "Über Raddrehung, Rollung und Aberration," "Abstrahieren und Vergleichen," "Bemerkungen über den Farbenkörper und das Mischungsgesetz," "Über Urteilsgefühle, was sie sind und was sie nicht sind."

The first half of the third volume of Tigerstedt's *Physiologische Methodik* (13) dealing with sensations is now complete, and has appeared in book form. It contains methods of experimentation and illustrations and descriptions of instruments. The sensory functions of the skin and organs of movement are discussed by von Frey, smell and taste by Zwaardemaker, light and color sense by Nagel, visual space by Hofmann, the eye by Gullstrand, the non-acoustical functions of the inner ear by Ewald, and the acoustical functions of the ear by K. L. Schaefer.

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SPECIAL REVIEWS

Psychology, General and Applied. H. MÜNSTERBERG. New York: Appleton, 1914. Pp. xiv + 487.

Professor Münsterberg's most recent book of psychology is a textbook of rare individuality and vigor. In compact form it presents the essentials of the most significant contributions of its author to psychological theory: the distinction between "causal" and "purposive" psychology, and the "activity theory" as opposed alike to associationism and to apperceptionism. And to the topics of the conventional textbook it adds chapters and sections on Social and on Applied Psychology.

Part I. discusses general principles. In Part II. the author treats the psychical elements under the main heads, Stimulation, Association, and Inhibition and discusses "complex individual processes" in chapters devoted to Perception, Ideas, Activity, and Inner States. The main topics of the ordinary textbook of psychology—facts of sensation, perception, memory and the like—are clearly set forth in these chapters and are presented with the customary skill of the author.

A final chapter (XV.) on personality (defined from the standpoint of causal psychology as "a perfect interplay of perceptions, memories, fancies and symbols with the feelings, emotions, acts of attention, of thought, and of will" (p. 213)) leads up to Part III. on "The Social Group." This section, like the preceding, considers first "elementary" and then "complex" processes. It starts from the admirably stated contrast between the sociologist, for whom "the starting point is the group itself," and the social psychologist who "must always begin with the individuals" (p. 225). An introductory chapter discusses individual differences under the headings "age," "sex and race," "strictly individual differences in temperament, character and intelligence" and "abnormal differences." There follow a chapter (XVII.) on Union, devoted chiefly to an account of communication, voluntary and involuntary, but including also a reference to the "consciousness of kinship," and a chapter (XVIII.) in which suggestion is contrasted with self-assertion, imitation with sympathy, and aggression with self-

expression. Especially useful is Dr. Münsterberg's account (pp. 254 ff.) of suggestion which is "always," he notes, "a proposition to action," though "not every proposition to action or to belief can be called a suggestion. . . . We have a right," he adds, "to speak of suggestion *only if resistance is to be broken down*. . . . Suggestion," he continues, "is nothing abnormal. There is no human life into which suggestion does not enter in a hundred forms." Both suggestibility to words and imitation of acts are forms of social subordination and both involve sympathy, "an inner imitation of the feelings." All these are contrasted with the equally significant "desire to assert oneself" in its different forms—"rejection of interference," "desire for self-expression and self display." "The combination which results from [the] approach, submission and self assertion" of individuals "is the reality with which the social psychologist is concerned." Otherwise stated, "the social mind" is the object of his study. Münsterberg discusses the social mind in the chapters on "Organization" and "Achievement," elaborating the "analogous physiological basis on both sides" and concluding with a brief and suggestive reference to the qualities of leadership.

Book I. which deals, as has appeared, with causal psychology is two hundred and fifty pages long. In Book II., which occupies only fifty pages, the principles of purposive psychology are set forth. To make these clear it is well to re-state Münsterberg's view of causal psychology which, he says (p. 13), studies "mere mental happenings" and seeks to link them causally. But psychic facts are, he points out (pp. 22 ff.), notoriously disconnected and incomplete. "It lies in the nature of the psychical objects that, however much regularity we may find in their behavior, they can never be directly linked by causal necessity" (p. 31). On the other hand, it can be "shown that man's perceptions and memories, volitions and impulses occur together with brain excitements." "This," to be sure, "is certainly not a *proof* that every mental event is correlated with nervous processes." But it abundantly justifies "the general postulate that every single mental state be understood as the accompaniment of a special brain process" (p. 39). And not only perceptions and memories but feelings, emotions, and volitions may be analyzed, described and explained by the causal psychologist who "cannot acknowledge that there is anything in the mind which does not allow such description and explanation." (Cf. p. 14, and pp. 286-287.)

At this point there emerges the conception of purposive psychology. For, despite its inner consistency, the causal conception, Münsterberg teaches, is not adequate. He therefore finds it necessary for us to regard the inner life as a whole and from an entirely different standpoint. Instead of explaining the mental life we are now to try to "understand its meaning" (p. 287); instead of "resolving the personality into the elementary bits of psychical atoms" we are to show "the true unity of the self" (p. 17); instead of adopting the "neutral attitude of a mere passive spectator" we are to "live through" our feelings and volitions (p. 289). From this essential purposive point of view "everything must be understood in relation to its purposes;" "another man is not the object of awareness but of acknowledgment"; and, finally, "purposes can be valued and every action can be measured by the standards of ideal purposes" (p. 293).

For the detail of this conception of consciousness readers are referred to Professor Münsterberg's pages. The reviewer ventures to add a few words of comment. It is questionable, in the first place, whether the phrase "purposive psychology" fully suggests the conception (sharply opposed to the causal, Humian view) of consciousness as a concrete, living self. The term "self-psychology" is more closely descriptive of what should be a study not only of the willing self but of the perceiving and remembering, the thinking and feeling self as well. To be sure, whether or not one adopt his phraseology, one can not overlook the importance and the timeliness of Münsterberg's vigorous teaching that a merely causal psychology, though consistent and useful, is both abstract and artificial ("a tremendous transformation of reality," p. 289); and that purposive psychology is no branch of metaphysics but a psychological "study and analysis of actual facts" (p. 287). Unhappily however Professor Münsterberg has already, in Book I., treated most of the "actual facts" from a causal point of view and he disappoints the reader by his failure to go back over perception, memory and feeling, to treat each from the purposive point of view, and to point out that the psychophysical, or causal, description and explanation, however relevant, is not sufficient.

As it stands, Book II. is, thus, a mere prolegomenon to "purposive psychology" whereas, in Book I., the author has often seemed to go far beyond the limits of pure psychophysical theory. In particular, the admirable paragraphs, in Book I., on friendship, communication, submission and self-assertion would certainly lose

their meaning if the self were regarded in strict accord with the principles of causal psychology as "a bundle of mental states which are linked together" (p. 12).

The last third of the book (130 pages) is devoted to the consideration of applied psychology "which speaks of the practical application of mental facts in the service of our human purposes" (p. 16). Book III. therefore forms, as it were, a union of the two which precede and affords meeting-ground for causal and purposive psychology. Students of theoretical psychology may profit by the author's admirable and balanced estimate of the value of applied psychology, by his clear statement of its limitations, and by his warning against bringing "the knowledge of applied psychology into any conflict with the natural instincts" (p. 348). Dr. Münsterberg distinguishes *psychotechnics*, which applies psychology to practical problems, from the psychohistorical sciences which "seek the application of these mental laws to the concrete historical facts" (p. 352). His concluding chapters on educational, legal, economic, medical and cultural psychology, are rich in material, clear in arrangement, and fruitful in suggestion.

MARY WHITON CALKINS

WELLESLEY COLLEGE

Le mécanisme cérébral de la pensée. N. KOSTYLEFF. Paris: Alcan, 1914. Pp. 313.

This volume is an important contribution to the work of the new school which is undertaking to explain the phenomena of human, as well as of animal, psychology strictly in terms of behavior. The author contends that in spite of its experimenting, psychology is still not an exact science because several of its fundamental categories (soul, ego, the unconscious, etc.) remain undefined. But these can all be defined, now, in terms of "cerebral reflexes," and when this is done not only do they acquire exact signification but, furthermore, many hitherto baffling phenomena (such as "imageless thought") find a ready explanation. And the best proof of the author's sincerity and competence is that he in no way avoids or disparages the findings of introspection.

In the first chapter Kostyleff reviews the work of Sétchénoff, Pawlow, Bechterew and others, and states his own thesis, that all conscious phenomena are to be explained in terms of cerebral reflexes. In the second chapter he boldly engages the most formidable of all his possible antagonists—the Würzburg school. After

expounding with extraordinary lucidity and fairness the work of Watt, Messer, and Bühler, he skillfully shows that precisely what they call "Perseveration" is neural residue, that what they call "Aufgabe" is neuro-muscular setting ("montage"), and that "imageless thought" is the interplay of cerebral reflexes. Indeed the notion of "Aufgabe" is of priceless value to the *objective* psychology (p. 51). And judgment is directed association—directed by an "Aufgabe," a neural setting. This chapter is one of the brilliant documents of psychology.

In the third, fourth, and fifth chapters Kostyleff reviews in a similar way the work of Freud, Jung and others of that school. The work of reinterpretation in terms of cerebral reflexes presents in this case fewer difficulties, but here again we find sympathetic exposition and incisive argument. "Abreagirung," the "unconscious" and even the "censor" find their positions readily and naturally in the psychology of reflex cerebration. But the Freudians have overdone the matter of infantile sexuality; and the psycho-analytic method is scrutinized with considerable frankness.

The next four chapters deal with literary inspiration and genius, and are largely the result of original investigations by Kostyleff. The point of view is very much that of Freud (though not that of some of his younger followers), and the outcome is what one expects from a brilliant mind employing a brilliant method. The interpretation of the phenomena in terms of cerebral reflexes is the same as in the chapters on the Freudian themes.

It will be seen that Kostyleff's volume is a daring application of behaviorism to the higher psychic processes of man. The book is not to be compared with Bechterew's *la psychologie objective* which, to the reviewer's mind, was a sort of pseudo-behaviorism, merely. Kostyleff grasps his subject-matter far more firmly than did Bechterew, and he exhibits an unusual breadth of documentation, sympathy in comprehension, and a merciless directness in criticism. His system is perhaps weakest when it tries to deal with "content" of consciousness (a failing, so far, of all behavioristic interpretations). It is nowhere stronger than in a remarkable passage at the close, where it is shown that the objective point of view is "so far from undermining the moral sciences" that it provides them with an objective basis; a positive foundation for moral education.

EDWIN B. HOLT

HARVARD UNIVERSITY

BOOKS RECEIVED

- BOLTON, J. S. *The Brain in Health and Disease.* New York: Longmans, Green, 1914. Pp. vi + 479. \$5.
- FULLER, B. *Life and Human Nature.* New York: Longmans, Green, (no date). Pp. xiii + 339. \$3.
- COMPAYRÉ, G. *Horace Mann et l'école publique aux États-Unis.* Paris: Delaplane, (no date). Pp. 121.
- COMPAYRÉ, G. *L'éducation intellectuelle et morale.* (2d repr.) Paris: Delaplane, (no date). Pp. viii + 456.
- ASH, I. E. *Fatigue and Its Effects upon Control.* New York: Science Press, 1914. Pp. v + 61. 60 cents. (Arch. of Psychol., No. 31.)
- The Psychological Researches of James McKeen Cattell: A Review by Some of His Pupils.* New York: Science Press, 1914. Pp. v + 101. \$1. (Arch. of Psychol., No. 30.)
- SCHUMANN, F. *Bericht über den VI. Kongress für experimentelle Psychologie in Göttingen vom 15. bis 18. April 1914.* Leipzig: Barth, 1914. Pp. iv + 351. Mk. 11.
- VIDARI, G. *Elementi di etica.* (3 ed.) Milano: Hoepli, 1911. Pp. xix + 380. L. 3.
- MASINI, M. U. & VIDONI, G. *L'assistenza e la terapia degli ammalati di mente.* Milano: Hoepli, 1914. Pp. viii + 233. L. 2.50.

NOTES AND NEWS

THE American Psychological Association at its meeting in Philadelphia elected the following officers: president, Professor J. B. Watson (Johns Hopkins); members of the Council: Professors R. P. Angier (Yale) and W. D. Scott (Northwestern). Professor R. M. Ogden (Kansas) continues as secretary-treasurer.

AT its recent meeting the Southern Society for Philosophy and Psychology elected the following officers: president, Professor J. C. Barnes (Maryville); vice-president, Professor E. E. Rall (Tennessee); secretary-treasurer, Professor L. R. Geissler (Georgia).

ACCORDING to the *London Times* A. van Gehuchten, professor of neuropathology at the University of Louvain, has died suddenly at Cambridge University, where he had been prosecuting his work after his removal from Belgium.

THOMAS F. VANCE, PH.D. (Iowa), has been appointed assistant professor of psychology in the Iowa College of Agriculture and Mechanic Arts.

THE first number of *School and Society*, edited by J. McKeen Cattell, has been received. This weekly journal will "emphasize the relations of education to the social order, scientific research in education and its applications, freedom of discussion, and reports and news of events of educational interest." It is published by the Science Press, New York, at \$3 per year.

ANNOUNCEMENT is also made of a new journal for philosophy, *Revista de Filosofía* edited by Professor José Ingenieros, of Buenos Aires. The subscription price is \$5 a year.

THE

PSYCHOLOGICAL BULLETIN

PROCEEDINGS OF THE TWENTY-THIRD ANNUAL
MEETING OF THE AMERICAN PSYCHOLOGICAL
ASSOCIATION, PHILADELPHIA, PENN-
SYLVANIA, DECEMBER 29, 30, 31,
1914.

REPORT OF THE SECRETARY, R. M. OGDEN, UNIVERSITY OF KANSAS.

The American Psychological Association held its twenty-third annual meeting at the University of Pennsylvania, on Tuesday, Wednesday, and Thursday, December 29, 30 and 31, 1914, in affiliation with the American Association for the Advancement of Science, and the Southern Society for Philosophy and Psychology.

The sessions were well attended, and the program provoked much discussion of a profitable character. The outstanding feature of the program was the large number of papers reporting experimentation in the field of normal psychology. Of the forty-five papers read, sixteen were of this class. The joint session with section L of the American Association for the Advancement of Science afforded an interesting program of seven papers on educational phases of psychology, while a special session for mental tests added six papers, indicating the continued activity of the laboratories in the investigation of this important subject. At the joint session with the Southern Society for Philosophy and Psychology, a varied program of general, social, and abnormal psychology was provided. Special sessions were also devoted to physiological psychology, with six titles, and to animal and abnormal psychology, with five. As a special feature of the first session for experimental psychology, Professor J. W. Baird of Clark University offered a demonstration of the introspective method. This was followed with great interest and called forth a lively discussion upon the merits of this much discussed method

of psychological procedure. Among those participating in the discussion were Professors Calkins, Cook, Dunlap, Pillsbury, Warren, and Watson.

Place was made upon the program for the address of Professor W. B. Pillsbury, the retiring vice-president of Section H of the American Association for the Advancement of Science, "The Function and Test of Definition and Method in Psychology."

The report of the committee on the academic status of psychology, which had been appointed since the last annual meeting by the president of the Association, was read by the chairman, Professor H. C. Warren. The report was printed and distributed to all in attendance. The committee also purposed to mail copies to all instructors of psychology who contributed data upon which the results and recommendations are based. The length of the report and the varied data and recommendations which it affords, render it impossible to treat it in any adequate form in these proceedings. Reference is therefore made to the report itself with the expressed hope that every member of the Association will secure a copy and examine it with the thoughtful care which it so fully warrants.

The exhibition of apparatus was somewhat disappointing in the number of pieces shown, yet several elaborate and highly interesting devices were offered. Among the exhibits may be mentioned: an apparatus for testing visual sensibility to contrast in animals, by H. M. Johnson of the Nela Research Laboratory; an apparatus for serial exposure in memory experiments, by E. H. Cameron of Yale University; a model for an animal maze and a tactimeter, by C. Homer Bean of New York. Three pieces of apparatus were shown by Frank N. Freeman of the University of Chicago, a puzzle box for illustrating problem-solving learning and for testing mechanical ability, a form of mirror-drawing apparatus which allows modification of the movement-stimulus relation, and a mirror frame for observing eye-movements. A tachistoscope was exhibited by F. C. Dockeray of the University of Kansas, and a self-recording hand dynamometer by H. C. McComas of Princeton University. E. A. Kirkpatrick of Fitchburg, Mass., exhibited the reports on class experiments which have been gathered by the Association's committee of which he has been chairman, and, in addition, the collection of pictures of psychologists which he has assembled.

The annual dinner of the Association was held in a private

dining-room of Kugler's Restaurant on Tuesday evening, Dec. 29. One hundred and two covers were laid. Following the dinner President Woodworth read his address, entitled "A Revision of Imageless Thought," after which a smoker held the participants until a late hour.

The regular meetings of the Association took place in the Medical Clinic Room of the University Hospital, while the apparatus exhibit and sectional meetings occurred near by in the Psychological Laboratory. Under the able supervision of Professor E. B. Twitmeyer, the local member of the Executive Committee, those in attendance were most cordially welcomed and their needs admirably provided for. Professors Witmer and Maxfield were also most generous in their personal hospitality.

TRANSACTIONS AT THE ANNUAL BUSINESS MEETING

The officers were elected in accordance with the plan now in force for a period of three years, this being the second year of its operation. Professor H. C. Warren, chairman of the committee on nominations elected at the New Haven meeting, presented the following report: For president, Professor John B. Watson. For members of the Council to succeed Professors Max Meyer and Margaret F. Washburn, the following four names were placed in nomination: Professors R. P. Angier, H. A. Carr, H. L. Hollingsworth, and W. D. Scott.

The recommendations of the committee were accepted. The secretary was instructed to cast the vote of the Association for Professor John B. Watson as president, while the ballot of the members present showed the election of Messrs. Angier and Scott to the Council. Upon nomination of the Council, Dr. Thomas H. Haines of Columbus, Ohio, was elected representative of the Association on the Council of the American Association for the Advancement of Science.

Professor R. S. Woodworth, Professor H. C. Warren, and Professor J. R. Angell were elected members of the committee on nominations for the coming year. On recommendation of the Council, the following persons were elected to membership in the Association: I. E. Ash, Ph.D., Assistant Professor of Educational Psychology, Ohio University (Athens); C. H. Bean, Ph.D., (late Assistant Professor of Psychology in the Indiana State Normal School) Columbia University; E. G. Boring, Ph.D., Instructor in Psychology, Cornell University; J. C. Chapman, Ph.D., Assistant

Professor of Experimental Education, College for Women, Cleveland, Ohio; H. W. Chase, Ph.D., Professor of Philosophy of Education, University of North Carolina; P. W. Cobb, B.S., M.D., Physiologist, Nela Research Laboratory, Cleveland, Ohio; H. T. Eno, A.B., LL.B., Princeton, N. J.; J. M. Fletcher, Ph.D., Professor of Psychology, Tulane University; Sven Froeberg, Ph.D., Professor of Philosophy and Psychology, Upsala College; K. S. Lashley, Ph.D., Johns Hopkins University; F. N. Maxfield, Ph.D., Assistant Professor of Psychology, University of Pennsylvania; W. R. Miles, Ph.D., Carnegie Nutrition Laboratory, Boston, Mass.; David Mitchell, Ph.D., Instructor in Psychology, University of Pennsylvania; H. T. Moore, Ph.D., Instructor in Psychology, Simmons College; Josiah Morse, Ph.D., Professor of Psychology and Philosophy, University of South Carolina; F. A. C. Perrin, Ph.D., Instructor in Psychology, University of Pittsburgh; F. C. Smith, Ph.D., Assistant Professor of Psychology, University of Utah; T. F. Vance, Ph.D., Assistant Professor of Psychology, Agricultural College, Ames, Iowa.

Reports from the various standing committees of the Association were heard. The committee on the standardization of mental measurements and tests reported progress. The committee on teaching experiments reported the collection of considerable data, then upon exhibition, and asked for directions and suggestions as to future work. It was voted that the committee be continued for the purpose of carrying on its compilation of references to class experiments with a view to the publication of a complete list. The resignation of the chairman of the committee, Professor E. A. Kirkpatrick, was received.

The committee on psychology and medical education reported informally, and by vote of the Association, was continued. In the absence of the chairman of the committee on prizes, no definite report could be offered. After some discussion as to the desirability of offering prizes, it was voted to continue the committee for another year.

The report of the committee on the academic status of psychology was accepted with thanks. The following chief resolutions of the committee were then voted by the Association:

1. "That a standing committee of this Association be appointed to continue the work of this interim committee. We suggest that it include a representative of the smaller institutions, an experimentalist, a genetic or comparative psychologist, and at least one

member with practical experience in the broad psychological curriculum."

2. "That at each annual meeting of the Association some topic be chosen for discussion which bears on the teaching of psychology." This resolution was amended to provide only for the next annual meeting.

3. "That the Association adopt the principle that the undergraduate psychological curriculum in any college or university, great or small, should be planned from the standpoint of psychology and in accordance with psychological ideals, rather than to fit the needs and meet the demands of some other branch of learning."

The president of the Association reported informally upon two cases investigated by him during the past year, which concerned the dismissal, upon questionable grounds, of psychologists from positions which they had been occupying for a number of years. No action was deemed advisable in either case, but upon recommendation of the Council, it was voted to enlarge the function of the committee on the academic status of psychology to enable it to undertake similar investigations when such cases are brought before the Association, and to report upon them.

With reference to the proposed meeting at San Francisco during the Panama-Pacific International Exposition, the returns of the canvass conducted by the Secretary were read. Among 146 returns, 75 thought the proposition feasible, while 46 dissented. Forty-one indicated that they would endeavor to attend, while 91 declined.

Upon recommendation of the Council it was voted that a special meeting for the reading of papers be held in affiliation with the American Association for the Advancement of Science within the time selected by that body for its meetings, viz., between August second and seventh, 1915. The organization, program, and all other arrangements for this special meeting were placed in the hands of a committee appointed by the president. This committee consists of: Professor G. M. Stratton, of the University of California, chairman; Professor Lillian J. Martin, and Professor Warner Brown.

The place of the twenty-fourth annual meeting of the Association, which will be held at the usual time, was left to the decision of the Council. The Council's recommendation that the meeting be held at Columbus, Ohio, in affiliation with the American Association for the Advancement of Science, failed to secure a second, objection being raised that the policy of the Association was to meet in alternate years independent of the larger organization.

Upon recommendation of the Council it was voted that titles for future programs of the Association be not listed unless summaries of the papers are submitted to the Secretary before the program is made up. The effect of this action is to provide the Secretary with sufficient information to enable the proper grouping of papers with reference to their contents, and also to make possible a wider distribution of the abstracts of papers prior to the meeting. A proposal to print the abstracts is also under consideration.

The report of the treasurer was read, as printed below, and accepted.

The following appropriations were recommended by the Council and affirmed by the Association:

To defray the expense of the 1914 smoker, \$25.00.

To defray the expenses incident upon the exhibit of apparatus at the 1914 meeting, an amount not to exceed \$25.00.

To meet the expenses of the 1915 committee on nominations, an amount not to exceed \$20.00.

The Council reaffirmed the action of the preceding Council in recommending that the president's address be distributed to members of the Association. This recommendation was voted and an appropriation of \$20.00 made to cover the expense of reprints and distribution.

The Council reported a deficit of approximately \$100.00 in the estimated income of the Association for 1915 to meet the expense of the year as budgeted. To meet such exigencies a constitutional amendment was proposed to substitute for the annual subscription of \$1.00, an annual assessment to be determined each year in accordance with a budget to be prepared and adopted by the Association. After discussion, the amendment was put to a vote and lost. It was then voted that a sum not to exceed \$100.00 may be withdrawn by the Council from the principal funds of the Association to meet the current expenses of the ensuing year.

The Secretary reported the resignation of six members of the Association, and the following deaths since the last meeting: Dr. Edmund B. Huey, Johns Hopkins Hospital, on Dec. 30, 1913. Professor C. S. Minot, Harvard Medical School, on Nov. 19, 1914. Professor Arthur H. Pierce, member of the Council, 1911 to 1913, Secretary of the Association, 1908 to 1910, Smith College, on Feb. 20, 1914. Dr. Theodate L. Smith, Clark University, on Feb. 16, 1914.

Preceding adjournment, the following resolution was offered by Professor Bingham and voted unanimously:

"That the Secretary be requested to express to the local member of the Executive Committee, Professor Twitmeyer, and through him to the Department of Psychology and the officers of the University of Pennsylvania, the appreciation of the American Psychological Association of the excellent facilities and many courtesies extended during this meeting."

REPORT OF THE TREASURER FOR THE YEAR 1914

Dr.

To Balance from the previous year.....	\$2,887.70
Dues received from members.....	275.42
Interest from July 1, 1913 to July 1, 1914.....	97.74
Sale of monographs 51 and 53, year ending December 31, 1913.....	22.99
Rebate on express overcharge.....	.20
	<hr/>
	\$3,284.05

Cr.

By Printing and supplies.....	\$ 87.05
Postage.....	61.62
Express.....	7.26
Reprints of Proceedings.....	17.71
Expenses of secretary (1913 meeting).....	24.00
Incidental expenses (1913 meeting).....	26.65
Expenses of Committee on Teaching Experiments (1913).....	36.35
Expenses of Committee on Mecklin Report (1913).....	5.20
Expenses of Committee on Nominations (1914).....	17.07
Secretary's stipend.....	250.00
Exchange on checks.....	.90
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	\$533.81
Balance in Fifth Avenue Bank.....	\$ 83.79
Balance in Union Dime Savings Institution	2,666.45
	<hr/>
	\$2,750.24
	<hr/>
	\$3,284.05

R. M. OGDEN,

Treasurer

Audited by the Council

LAWRENCE, KANSAS,
December 21, 1914

ABSTRACTS OF PAPERS

STUDIES IN EXPERIMENTAL PSYCHOLOGY

The Introspective Method (with Demonstrations). J. W. BAIRD,
Clark University.

Critics have objected on *a priori* grounds to the use of introspection as a scientific method; and they have advanced arguments which are alleged to prove that the method is unreliable and invalid. With scarcely an exception and with few verbal changes these arguments may be turned quite as aptly and quite as cogently against any other scientific method which the objector may choose to criticize. And a survey of the literature of psychology reveals the significant fact that the defects of introspection have been discovered solely by critics who have never employed the method save in the most crude and casual fashion; those investigators who have submitted the introspective method to a thorough-going or systematic test are unanimous in testifying to its validity.

The chief purpose of the author is to enter a plea for systematic training in the use of the introspective method. Illustrations from bacteriology and histology serve to emphasize the necessity of systematic training in accuracy of observation and in definiteness and completeness of description. Various defects of the published introspections of the current literature were cited, and means of obviating these defects were indicated. The author discussed and demonstrated the significance of a judicious selection of experimental materials, of an appropriate choice of experimental procedure, and of a suitable arrangement of experimental conditions.

A Preliminary Report of an Introspective Study of the Process of Comparing. SAMUEL W. FERNBERGER, Clark University.

Although the process of comparing is very widely employed in psychological research, inasmuch as it is the basis for the determination of a subject's sensitivity, still the structural basis of this process is far from being well understood.

In the present study, two sorts of stimuli were employed as materials for comparing. In one group of experiments, we presented a lifted weight series to our subjects; and in the other, our subjects were asked to compare the length of lines. Detailed

introspections were given immediately following each comparison judgment. Our stimuli were presented in accordance with the experimental procedure of the method of constant stimuli. Although our subjects were highly trained in the method of systematic, experimental introspection, they were quite naïve in regard to our particular experimental technique.

In general, we noted three distinct stages of mechanization of the process of comparing. (1) The initial process was characterized by a perception of the standard stimulus, followed by a perception of the comparison stimulus, with an awareness in each case of the sensations aroused by these stimuli. Some time during the perception of the comparison stimulus, there would appear in consciousness an image of the sensations attendant upon the perception of the standard stimulus. For our series in lifted weights, this image was kinæsthetic. For our visual series, a retinal comparison was sometimes made, but the criterion of comparison here was more frequently of a kinæsthetic sort, being either kinæsthesia of eye movement along the lines or kinæsthesia of eye accommodation. (2) In a later period of mechanization, the comparison stimulus was perceived in the presence of a motor set or preparation carried over from the perception of the standard stimulus; and the comparison became merely an awareness of a change in this set, along with an awareness of the direction of that change. (3) In a final stage of mechanization, this motor *Einstellung* was assumed when the subject approached the *pair* of stimuli, and the comparison was made on the basis of a mere perception of the comparison stimulus—the standard stimulus often being never clearly perceived.

The equality judgment, on the other hand, became increasingly difficult during this mechanization. This judgment was of a negative sort, *i. e.*, the non-awareness of any change in this motor preparation. This may or may not develop later into a comparison experience of positive equality.

An Experimental Investigation of the Process of Recognizing at Different Stages of its Mechanization. ELIZABETH L. WOODS,
Vassar College.

This investigation aimed to determine the nature of that process which runs its course when one is aware that a given stimulus is not new. The procedure consisted in presenting novel stimuli (visual, auditory, tactual, and olfactory); and in re-presenting them in successive sittings until a stage was reached at which the

observer had become perfectly familiar with each stimulus. The observer furnished an introspective description of each experience with each stimulus, from the initial stage of the novelty, through various stages of progressive familiarization, until his reaction to it became a mechanized act accompanied by no consciousness of familiarity.

The results show that: (1) The process of recognizing is exceedingly variable, both in its temporal duration and its structural content. The number of affective and sensory contents bears a constant relation to the degree of familiarity as measured by rapidity and accuracy of recognizing. (2) The distinguishing characteristic of the process of recognizing is purely functional, and is to be conceived in terms of the behavior of attention, that is, the consciousness which (unfortunately) is usually called the "feeling of familiarity" is an attentive behavior which is characterized by: (a) The order or temporal sequence of the mental elements which comprise its structural content; (b) The relative clearness which attaches to the elements involved. (3) The particular attentive behavior, which constitutes the essence of the process of recognizing, is called forth in any given case by a certain preparedness to recognize (a recognition-attitude) which is a direct product of the situation in which the observer finds himself.

An Experimental Study of Generalizing Abstraction and the General Concept. SARAH CAROLYN FISHER, Clark University.

The purpose of this investigation was to make an introspective genetic study of generalizing abstraction and the general concept. Drawings were presented which although different were sufficiently homogeneous to constitute a class. Under each drawing appeared the fictitious group name, the observer's task being to define this name. At weekly intervals thereafter the observer was asked to recall what he could about the group name. The conclusions regarding generalizing abstraction were based on the observer's descriptions of their experiences in examining the series; those regarding the nature of the concept at different developmental levels, from their descriptions of its appearance in consciousness in response to the constant task of recalling.

The results were as follows: Generalizing abstraction consisted essentially in a certain typical behavior of consciousness and attention: Upon the instigation of the understanding of the general task of defining the group name, the chance noting of a feature

marked the initiation of a persistent tendency for the attention and fixation to return in subsequent stimuli to the region of that feature, whereupon the latter, if present, stood out immediately and clearly. The first noting of the feature was usually marked by tensions which, with or without explicit verbal self-instruction, functioned as an intention to investigate the feature. The tensions often persisted during the later examinations, and functioned as an awareness of something to be done. The easy and unhesitating moment of shift from the repeating feature as it stood out constituted essentially the experience of the similarity of the figure in respect to the feature.

The general concept underwent a series of progressive modifications in its conscious form, evolving from an initial detailed and concrete form to a final highly schematic or verbal form. The experiences that certain features were general likewise evolved from initial highly explicit perceptual or imaginal awarenesses that these features were present in every figure, to final forms which consisted in nothing more than the fact that the essential features appeared easily and uncontestedly, that they dominated consciousness and were unhesitatingly described whenever the observer was in a situation of stating what the group name meant. In this final form, the experience of generality cannot be regarded as a "consciousness" or a "knowing" that a feature was general in any save an implicit sense; it was rather a behavior that such and such a feature was general, a treatment of it as general. No essential structural difference was found between imagery of general and that of non-general features.

Influence of Expectation on Sound-Localization. L. R. GEISSLER,
University of Georgia.

The click of a telephone-receiver was presented in a horizontal plane at 30' distances from each other, with intimation that distance would be 10'. Before each stimulus the observer was instructed either to expect the sound from the front, back, right, or left half, or from one of the four quadrants, or not to expect the sound from anywhere. After stimulation the observer was to localize the sound and indicate the direction of his expectation. Each of the 20 observers made 68 localizations, and ten observers concluded their set of tests with an introspective account of the processes of localization and of expectation. Main results and conclusions: (1) The original error of sound-displacement due to the usual

front-back confusion, which in our experiments was found greatest with stimuli from the back and smallest with sounds opposite the ears, is either increased or decreased by almost half its size according as expectation is directed either to the opposite or to the same front or back half from which the stimuli are given. (2) Whether sound is expected from a well-defined point or a region in the circumference is indifferent for the accuracy of localization. (3) The negative instruction "no expectation" or "unlimited" is as a rule interpreted in the positive sense of "expectation *ad libidum*." (4) Under this instruction 50 per cent. of the sounds are expected from the right front, 37.5 per cent. from the left front, the rest from the back half. Likewise sounds are more frequently located in front than in the back. (5) This seems due to the influence of vision upon the whole mental life. (6) The 8 women observers without previous psychological training were about 10 per cent. more accurate in localizing sounds than the 12 men who had a uniform and moderate amount of special and general psychological training. (7) The left ear was uniformly about 3 per cent. more accurate than the right ear.

Awareness and Partial Awareness as Factors in Efficiency. G. F. ARPS, Ohio State University.

The data supporting this study were obtained by means of the Bergström Ergograph. The purpose of the study is to determine whether a condition of relatively complete awareness of results is productive of greater or less efficiency than a condition of partial awareness. To what extent, if any, does knowledge of results further activity; or, to what extent does a lack of knowledge restrict activity; or, is the aggregate accomplishment indifferent to differing degrees of conscious accompaniments.

The study is divided into two series of experiments alternately developed. The "known" series consists of experiments in which the observer is fully aware of his efficiency during the conduct of the experiment and of his efficiencies during previous known work periods. The "unknown" series is conducted under conditions paralleling the known except that the results are at all times closed to the observer during, as well as after the completion of, the experiment. Both the "known" and the "unknown" series consist of work periods made up of subdivisions each of which has a constant duration of ten seconds. The rests in each of the subdivisions of the periods, common to the two series, vary from zero

to ten seconds. Eleven work periods, each separated by an interval of forty-eight hours, constitute a series in which there is continuous work in the first period; rest of one second to every ten seconds of work in the second period; two seconds' rest to every ten seconds of work in the third period; and so on until the seconds of rest equal the seconds of work, *i. e.*, ten.

The results may be summarized briefly as follows: (1) Within the limits operative for the present study, both the *absolute amount* of work and the *rate* of work done under conditions of "knowledge of results" exceed that done under conditions of "ignorance of results." (2) When work is long continued and to the point of exhaustion a curious phenomenon of recovery appears which can not be entirely identified with similar phenomena peculiar to fatigue. (3) Practice effects, even though long continued, can not be eliminated. (4) The condition of "ignorance of results" is more effective in the first than in the second set of experiments because of the involuntary function of the imagination. (5) The optimal rate of work lies between $.0755 \frac{\text{KgM}}{\text{Sec.}}$ and $.0855 \frac{\text{KgM}}{\text{Sec.}}$.

External Localization in Memorizing Verbal Material. ELEANOR A. McC. GAMBLE, Wellesley College.

The experiments here reported were made by the method of right associates (*Treffer- und Zeitmethode*) with visual presentation. The material consisted of "normal" series of nonsense syllables. The peculiar features of the experiments were two: (1) The subjects learned the syllables from the sharply demarcated and symmetrically arranged fields of an exposure tablet. (2) In the test-procedure the syllables were singly exposed, in part in the same places in which they had stood during the learning-procedure and, in part, in other places. The immediate object of the experiments was to determine whether or not the syllables exposed in "right places" evoked the greater number of right associates, and syllables exposed in "wrong places" the greater number of wrong associates and "zero cases." If this is a fact it is an indirect proof of the importance of place-associations in memorizing, for in the cases of right exposure, place associations would seem to reinforce the associations between the pairs of syllables. On the other hand, if syllables exposed in wrong places are relatively unlikely to recall the proper associates, or if the reproduction-time is unduly prolonged, one may well suspect interference between two sets of associative connections.

As a matter of fact, the results show a slight but clear correlation between right exposure and right recall, and between wrong exposure and wrong recall and negative reaction. The reaction-times bear out the suppositions just formulated in regard to reinforcement and interference. Of the six subjects whose results are worth considering, three show plainly a dislocation of syllable-associations by wrong exposure, two show little disturbance, and one obtained in the case of wrong exposure an actually larger number of right associates with a much longer average reproduction-time. These last three subjects correctly localized nearly all the syllables exposed, whether in wrong or in right places, whereas the three subjects who were more evidently disturbed by wrong exposure, were frequently unable to say where a wrongly-exposed syllable had formerly stood. All the subjects but one were of the visual or mixed sensorial type. The one subject who had little visual imagery was among the three who were most disturbed by wrong exposure. Thus, disturbance by wrong exposure seems to have been coupled with weak rather than with strong place-associations. The testimony of most of the subjects reveals a deliberate use of place-associations both in memorizing and in recalling syllables.

On the Memory for Musical Sequences. KATE GORDON, Bryn Mawr College.

Tests were made for the purpose of determining whether the "meaning" of a musical selection has an appreciable effect upon the process of memorizing it. The learning of short musical lines was compared with the learning of series of nonsense syllables which were equal in length, rate of presentation, and in the number of repeated elements, to the corresponding lines of music. Both were auditory series. The results show that on the whole the music was learned more readily than the syllables, though the difference seems not to be so great as that ordinarily found between significant and non-significant material. In cases where the music and the syllables were re-learned after an interval of three or four weeks the superiority of the music was more marked.

Further tests were made in which the above musical selections were learned with the order of their notes reversed, *i. e.*, the lines were played backwards. By this device two lines may be compared which are the same in length, pitch of tones, rhythm and intervals, but which differ in musical meaning, inasmuch as a significant musical series is in general non-reversible. The results show that

the music with meaning has a decided superiority over the music with the meaning eliminated, although in the case of two unmusical subjects there was practically no difference in learning time between music played backwards and that played forwards. The original series of syllables were also learned in reversed order, and here there was a considerable saving in time of learning. Thus the nonsense material when reversed was more easily learned than before whereas the significant material when reversed was more hardly learned.

The subjects were asked to record their affective judgment on each line of music learned. There appeared to be no correlation between the agreeableness or disagreeableness of a selection and the readiness with which it was learned.

Affective Factors of Recall. G. C. MYERS, Brooklyn Training School.

In the present study, 232 subjects of normal school, high school, and grades were asked to write random lists of names of familiar things such as colors, animals, musical instruments, famous men, etc. They then were surprised by the request to write the name of the thing of each class liked best; then the thing liked least. Three forms of the test were given. In the first, the random names of each class were limited to ten; in the second and third, the time was the constant factor. In the first and third the chief-like and least-like were given regardless of the random lists; in the second, they were limited to the random lists.

The records show that the thing liked best, on the average, appears much nearer the first name in the random list than the thing liked least. Without exception, in all random lists, the percentage of cases of the chief-like are predominantly above the median, and those of the least-like, below. The least-like appeared below the chief-like in about 75 per cent. of the cases. There is no appreciable sex difference. About as great variability obtained for the likes as for the dislikes. Many irrelevant factors helped to determine the make-up of the random lists.

The data seem to be proof positive that the "disagreeable does obliviate to a more striking degree than the pleasant." Nevertheless, all they do prove is that one tends to express the agreeable and to neglect and inhibit expression of the disagreeable. We are social creatures subject to social constraint; therefore we have social memories. What we recall as well as what we express is, in a large measure, socially determined.

Some Cases of Paramnesia. NATHAN A. HARVEY, Ypsilanti, Michigan.

The writer has collected from his classes twenty-nine cases of paramnesia, and has analyzed them in considerable detail. Paramnesia is limited to the "has-been-experienced-before" feeling. It is the identifying paramnesia of Kraepelin. It involves an error in the element of mental recognition, without any inaccuracy of the perceptive process. Twelve cases are described in which the feeling of familiarity was experienced in the midst of surroundings that had been visited before. Yet this feeling of familiarity was quite distinct from the feeling experienced five minutes afterward. Eleven of the cases describe the feeling of familiarity as occurring in places that could never have been visited before. Leaving aside the impossibility of proving in each case that a previous experience of some kind with this situation had been forgotten, the fact that a feeling of familiarity occurs in places with which the person is already acquainted, renders untenable the explanation that previously experienced elements in the situation arouse the feeling of familiarity.

Memory may be defined as the reinstatement of a previous mental experience with the same conscious elements. The two elements of memory are mental reproduction and mental recognition. Either element may occur without the other. The transmission of an impulse through the same brain center that it passed through before is the concomitant of the element of mental reproduction; the radiation of the impulse out into the same fringing cells is the concomitant of the element of mental recognition. If we may suppose, that on rare occasions the nervous impulse enters the fringing cells from some other direction than the brain center, and then immediately afterward enters the brain center, and from that direction passes into the fringing cells, we should have two experiences of the conscious elements with only one perception. Consequently the perception would seem familiar in the same way that a remembered experience seems familiar.

Individual Differences in Fluctuations of the Attention. H. C. McCOMAS, Princeton University.

The purpose of the experiment was to detect individual differences in the fluctuations of attention when directed to minimal auditory and visual stimuli. A watch in an audiometer was used for the auditory work and a quadrant of a Masson disk for the

visual. The subjects indicated the presence of the stimuli by pressing a bulb which connected with a kymograph in an adjoining room. A pneumograph gave the respiration curves; and the time was indicated by a Jaquet marker.

The records show individual differences, varying in the six subjects from an average of about 3 to 9 seconds per fluctuation. Four of the six subjects had more frequent fluctuations for visual stimuli than for auditory. They averaged one fluctuation in 7.5 seconds for auditory, and one in 5.4 seconds for visual stimuli. Two of the subjects had more frequent fluctuations for auditory than for visual stimuli. If these fluctuations are conditioned by any common factor such as variation in blood pressure it would seem that the fluctuations for the two senses should have rates more nearly alike. There were individual differences in the rates of respiration; but there is no correlation between the rate of respiration and the rate of fluctuation. This is interesting in view of the prevalent disposition to relate respiration and the fluctuations of attention. The mean variation from the averages for the several subjects shows characteristic differences. Those who show most certainty for the auditory fluctuations do so also for the visual. This may well be due to suggestion which carries over from one series to the other. A striking individual difference is in the disposition to get more fluctuations as a test proceeds. All but one subject showed this tendency in varying degrees.

Effects of Practice on the Singing and Discrimination of Tones.
E. H. CAMERON, Yale University.

Learning and Distribution of Practice in Archery. K. S. LASHLEY,
Johns Hopkins University.

Five groups of human subjects, averaging five to the group, were allowed different daily amounts of practice in shooting at a mark with the English long-bow from a constant distance. The number of arrows shot daily by each individual was for the five groups, 5, 12, 20, 40, and 60, respectively. The target was so arranged that the distance of each shot from the center of the mark could be measured accurately. No instructions were given the subjects beyond what seemed necessary for safety in handling the bow.

The small number of subjects makes it necessary to condense the records greatly in computing averages in order to eliminate

chance fluctuations. When all the first half of practice is taken as an index of initial skill, and all the second half is an index of final skill, the average improvement is, for the groups:

Shots per day.....	5	12	20	40	60
Improvement for equal practice..	14.2	12.2	5.3	1.8	6.5 inches.

Such averages show that a given amount of practice distributed over many days results in more rapid learning than the same amount condensed into a few long practice periods.

An Experiment in Choice Reaction. PRENTICE REEVES, Princeton University.

The experiment was designed to discover individual differences in choice reaction time. One group consisted of 45 untrained subjects; a second group included 8 subjects with some laboratory experience; a third group consisted of 6 graduates specializing in psychology. There were 4 reaction keys, each surmounted with a card bearing from 1 to 4 dots. A sliding panel behind a ground glass allowed instantaneous exposure of similar dots with a puzzle stimulus of 5 dots. Any false reaction gave a signal to the operator. The Hipp chronoscope was used. The connections were interchangeable so that different keys could be used for any dot in different series.

The choice reactions were given in series of twenty. The first two groups were not given series enough to reach a level in the practice curves. In the third group the curves indicate that after the second day there is very little further improvement with the standard order. After three hundred reactions the order of the keys was changed. The curves plotted for the second order seem to make an almost continuous curve with the first order curve, thus indicating the transfer of practice. The quickest reaction is obtained to the simplest signal regardless of the finger used. The right index finger yields in general the fastest reaction. Individual differences appear in all groups. A positive correlation was found between simple reactions and association time, but no correlation between choice reaction and association time. There is no correlation between mean variations and false reactions; and a small correlation between right and left hand reactions.

Determination of the Psychically Unitary Color-Sensations. CHRISTINE LADD-FRANKLIN, New York.

The writer has objected for some time to both the Helmholtz and the Hering color-theory on the ground (among many other

grounds) that neither of them permits recognition of the most fundamental fact concerning the discriminable chromatic sensations—the fact that they are of two distinct kinds: the exact Red, Yellow, Green and Blue are what may be described as *psychically unitary*, the others (the yellow-greens, the blue-reds, etc.) are non-unitary colors, or color-blends. (The term "mixture" should, of course, be reserved for *physical* mixtures of ether radiations.) This distinction is one which is patent to the briefest consideration, though it is wholly uninteresting in daily life, and is also wholly ignored, unfortunately, in many psychological laboratories. It was known to Leonardo da Vinci, and strongly insisted upon, among others, by Aubert. But it was obscured, for many generations, by Newton, who saw seven colors in the spectrum because there are seven notes in the tonal octave, and by the psychologists who have followed either Helmholtz or Hering. Westphal quotes the writer as authority for the statement that the real red and the real green are not complementary colors, but he complains that I do not give the method by which I have established this fact. Von Kries, also, has frequently objected that while I make much of this distinction as subversive of the other color theories, and have devised a new theory of my own to do justice to it (among other things), I nevertheless have not proved that the judgment is really one that can be formed. I have not hitherto, had proper spectroscopic facilities for this investigation, but it has lately occurred to me that in this case spectral lights are not necessary, that colored papers, in fact, are preferable. By exhibiting at once say seven colors, on discs rotated by a common electric motor, made practically equal in intensity and saturation but just noticeably different in color tone, it is found that all observers can distinguish between the unitary colors and the color-blends. The judgment is a perfectly easy one to make; none of our observers failed to make it save one, and he turned out to have dichromatic vision—which involves of course the impossibility of ever seeing a color-blend. We recommend this method for regular demonstration purposes in laboratories.

The Vowel Character of Tuning Fork Tones. A. P. WEISS, Ohio State University.

A preliminary experiment to determine the validity of W. Koehler's law: "The quality series of the phenomenal tone system are limited by absolute supra-liminal differences and each octave

is more than one octave distant." The results of the experiment support the law if the definition of "quality" is taken to mean the vowel character (*Vokalcharakter*) of tones. The forks used were between the limits of 128 and 1152 vibrations and the vowels which their tones resembled ranged through *um* (as in hum); *o* (in tone); *a* (in father); *a* (in sale); *e* (in feel). The results justify a more extensively quantitative study. M. F. Meyer has suggested the term "vocality" as a substitute for "vowel character" and in the opinion of the experimenter this term is well chosen since it expresses both a scientific fact and also one which has long been recognized as "voicing" by instrument makers.

STUDIES IN EDUCATIONAL PSYCHOLOGY AND MENTAL TESTS

The Influence of Improvement in one Simple Mental Process Upon Other Related Processes. A. T. POFFENBERGER, JR., Columbia University.

This experiment represents an effort to reduce the problem of the transfer of training to its lowest terms, namely to the formation of specific bonds or connections between situations and responses and the use of these bonds in other reactions. It differs from previous work in three particulars: First, the training series was continued long enough to bring the curves of improvement practically to a level, before the transfer effect was measured; second, an attempt was made to eliminate the more general factors which are conceded to be the source of transfer effect, such as the proper direction of the attention during the test, familiarity with psychological tests, etc.; third, the tests were so chosen that the training could be analyzed into the formation of bonds or connections between situation and response. The bonds or connections discussed are purely objective and do not refer to the underlying physiological processes. Although this must be the real seat of transfer, investigations must deal with the objective cause of such processes and the objective response resulting from such physiological action.

As an example of the type of tests used the following may be noted: Subjects were trained in the cancellation of 3's and 5's in the Number Checking blank of Woodworth and Wells. Tests before and after the training were taken in the cancellation of all groups containing the numbers 3 and 5, in the Number Group Checking blank. This case is called by Thorndike the "Entire Similar Change by the Composition of Totals," where the test

process is made up of elementary processes in which the subject had been trained.

The conclusions drawn from an interpretation of the data are as follows: (1) Where there are no identical bonds between stimulus and response in the two processes, the influence of one process upon another will be zero, *i. e.*, there will be neither transfer nor interference. (2) Where there are identical elements in the two processes, or where a given process involves one or more bonds previously formed, there will be a positive transfer effect. (3) Where one test necessitates the breaking of previously formed bonds and the formation of new ones, there will be a negative effect or an interference.

Habit Formation and Foreign Language Teaching. STUART H. ROWE, Wadleigh High School.

Many of these problems have long been discussed, but on the basis of varying experience rather than psychological principle. Prominent among these questions are those touching the analysis of the problem, the use of the so-called direct method, the place and time of translation, composition, conversation, etc., the use of imitative, play, competitive and dramatic instincts, the assistance to be gained from the emotions and interests, the extent to which repetition may be employed, how to avoid listlessness and unintentional inattention, how slow students may be speeded up, and how wrong first impressions may be avoided, etc. The analysis is really revealed in groups of habits, clustering about the processes of speaking, reading, writing, translating, and expressing thought. All of these are habits provoked by a given situation and followed by a specific sort of activity.

The direct method is preferred because it involves development of habits of vocal speech and these assist in developing an atmosphere necessary for the fullest understanding and appreciation of the written language. The ordinary translation method involves a radically different set of habits and a transference from one atmosphere to another. In the direct method translation sinks into the background. The object is to understand and be understood. It is a *test* of progress rather than a *means* of progress. Conversation and composition, also reading without translating after thought has been gained, take the place of translation. These habits are permanently good in themselves. Suggestions are made for the use of imitation, play, and the competitive and dramatic instincts.

Full use should be made of the whole recitation exercise by insisting that every recitation be made out loud and distinct. Use of the phonograph, phonetic analysis and also other devices are based on the imitative instinct. Similarly, the competitive and the dramatic instinct may be used and should form incentives and starting-points for habits of value. The emotions furnish incentives through the possibility of enlisting sympathetic admiration of a foreign people and appreciation of their culture. These are representative of a number of problems briefly answered as far as possible from a psychological point of view with the minimum of pedagogical bias.

A Method for Quantitative Study of Family Likeness in Arithmetical Abilities. MARGARET V. COBB, University of Illinois.

Some of the Courtis standard tests in arithmetic have been used as a means of measuring and comparing arithmetical facility in the members of families. The tests used were the one-minute tests in addition, subtraction, multiplication, division, and in copying figures. The measurements secured seem to be more exact than have previously been obtained in studies of the inheritance of arithmetical ability. The method has been tested on a group of twenty children and their parents. Since this includes the records of all persons over fourteen years old for whose parents records could at the time be obtained, it is not a selected group. The study shows that the method is entirely feasible, and promises to yield interesting results. The following tentative statements may be made. (1) A child may be expected to show the arithmetical characteristics of one of his parents. That is, the relations of a child's skill in each of the four simple processes to each other and to his speed in copying figures tend to be like the corresponding relations in one of his parents. (2) A child of either sex may bear this resemblance to either parent, but to one only. Pearson's correlation formula gives as the coefficients for these twenty children + .60 when compared with the like, and + .01 when compared with the unlike parent. (3) A child shows a greater resemblance to the like parent than to a standard taken between the records of the two parents. The Pearson coefficients are + .60 and + .49, respectively. (4) Many considerations point to the conclusion that this is hereditary likeness.

Relation of Initial Rate and Final Performance in Learning Experiments. E. A. KIRKPATRICK, Fitchburg, Mass.

The writer finds great individual differences in the initial and final performances of individuals in practice tests. In view of the numerous attempts to use simple tests to determine the probability of ultimate success not only in educational but also in vocational lines it is important to know how to interpret a single test or a short practice curve. It is suggested that all who make practice tests of any kind, should study the individual records as well as averages with the idea of determining the real significance of accuracy and rapidity in first tests in relation to later performances.

Notes on Certain Aspects of Learning. S. S. COLVIN, Brown University.

The first of these studies consisted of a preliminary analysis of the factors involved in learning to operate the linotype. The subject of the experiment was a skilled proof-reader, the director of the experiment an expert operator. The learner progressed normally during the early part of the test, but when he attempted to "justify" the line, all progress absolutely ended, and although the experiment was continued for forty days, the learner made no further advance. The attempt to introduce a complex and difficult act of skill, when the more simple acts had not been mechanized, caused complete failure. The learner showed marked absence of the transfer of skill in spelling and punctuation from the proof-reading situation to the linotype situation. As a proof-reader he was skilled in these particulars, but as a compositor he was wretched in both punctuation and spelling.

The object of the second study was to determine if there are any characteristic differences between the learning curves of normal and sub-normal children. In the test five normal children were compared with five sub-normal children (determined by the Binet tests). Each normal child was paired with a sub-normal child of the same mental age. The test consisted in learning to cancel a's. A comparison of the learning curves showed that in every case the normal child made greater improvement with less fluctuations than did the sub-normal child.

A somewhat more intensive study was made of one sub-normal and one normal child. There were indications that the power of attention and discrimination acquired in the "a" test was carried over in a marked degree to a later "o" test in the case of the sub-

normal child; in the case of the normal child this transfer effect was much less marked. This suggests that a fruitful field for the study of transfer may exist in the learning processes of the feeble-minded, where capacities are more isolated and in a less developed state.

Some Learning Curves. M. E. HAGGERTY, Indiana University.

This paper presents a number of curves, each showing the progress in learning during a four weeks' period. The fields of learning are arithmetic, reading, composition and writing. The subjects are college students and children in the high school and grades. The curves show that learning is quite an individual matter. Some persons improve under conditions under which other persons fail. The number losing in efficiency is large, in some cases almost as much as 40 per cent. of those practising. These results, obtained under unusually good school conditions, indicate the very great importance of knowing the individual facts about each learner. It is probable that conditions could be so adjusted that 90 per cent. of learners would improve. This was true of the experiments in reading where only one in forty-six college students failed to gain both in speed and quality.

Some Norms of College Freshmen. W. V. BINGHAM, Dartmouth College.

This paper reports the results obtained in mental tests given last year to two hundred members of the Dartmouth freshmen class. The series of tests included two motor tests: the hand dynamometer test for endurance of grip, and the tapping test; discrimination of lifted weights; memory span for auditory digits; logical memory for a paragraph of prose; cancellation; perception of form; the Woodworth and Wells tests of controlled association, including color naming, easy opposites, easy verb-object, species-genus, genus-species, part-whole, whole-part, subject-verb, verb-subject, adjective-noun, mixed relations, and harder directions. Some tests of suggestibility and of ingenuity were also tried. All of the tests were given individually except the two memory tests, which were given to groups of from eight to twelve. From the results of most of these tests, curves of percentile distribution have been plotted. These will serve as scales for quick measurement of adults in terms of their rank in a large group.

The Point Scale Method of Measuring Mental Ability. ROBERT M. YERKES, Harvard University.

The Binet Scale is avowedly a rough and ready, practical method. It is open to many serious objections, among which the following have especially influenced the writer: (1) The age-group arrangement of "tests" is unsatisfactory both in principle and because it is based upon inadequate data. (2) It is unfair to compare the intelligence of individuals on the basis of results from different sets of "tests." (3) The "all-or-none" principle applied to credits yields inaccurate and at times wholly unreliable results. (4) The Scale offers almost unlimited chance for variations in use, and numerous variations actually appear because of the bias, or other aspect of the personal equation, of the examiner. (5) It does not afford opportunity for reasonably accurate measurements of intelligence, however carefully it may be applied, nor for the obtaining of observations of value for varied comparisons of intelligence. (6) It gives no reliable indications of expected deviations, one to sex, race, or social differences. (7) It is now used in many more or less markedly differing forms and in various ways.

These and similar objections have led to a search for a new method of measuring intelligence which shall be an improvement on the Binet Scale. In the Psychopathic Hospital, Boston, and in the Cambridge public schools, we have tried out a point scale method which has many advantages over the Binet Scale. It consists of twenty problems or tasks chosen, with a few exceptions and modifications, from the Binet list. The Scale is planned for measurements of intelligence up to twelve years. Credit based upon the merit of response is given according to definite rules. The maximum credit for the twenty tasks is one hundred points.

We propose to determine the percentage value of the intelligence of large numbers of individuals, and from these data to plot distribution curves which shall indicate the normal range of variation for age, sex, race, and social groups. These curves of distribution will be used as norms. The obtaining of them will necessarily demand a large amount of careful work, but with such norms at hand, it should be possible by the Point Scale method, at the expense of no more time or labor than the application of the Binet Scale demands, to obtain much more accurate and valuable information concerning the intelligence of a given normal, defective, or pathological individual.

Point Scale Rating of Delinquent Boys and Girls. THOMAS H. HAINES, Bureau of Juvenile Research, Columbus, Ohio.

The Yerkes-Bridges Point Scale for Mental Measurement (1) puts the mental measurement device on the same self perfective basis as Sargent's Anthropometric Charts; (2) it makes it easy to plot curves summarizing the mentality, by years, of children of different races, different sexes, different social strata, and different educational advantages, which curves are immediately and directly comparable; (3) it is a much more flexible measure, making allowance for special development encouraged by specialized environments, in this way dealing more fairly with the retarded and older child; and (4) it is fairer, also, in that it allows partial credits for partial results. Nineteen of the twenty Point Scale tests being Binet tests, it is a trifling matter, when the Point Scale record is complete, to give the five or six tests necessary to complete the Binet rating. In examining two hundred delinquent minors, it was the aim, at first, to test the value of the Point Scale, by comparison with the Binet-Simon Scale. But it soon began to appear, even with the rather limited material upon which the Point Scale had been standardized, that it was a valuable and indispensable ally of the Binet Scale in estimating intelligence, and in making classification of our material by mental rating.

The Point Scale ratings run about the same in the medium to low grade morons, who average about nine years in mentality, and they run higher, by half a year, in the high grade morons, who average about eleven years. Point Scale ratings tend higher in those who test above twelve years by Binet Scale. The Point Scale throws doubt on the defect of intelligence of some who would be rated high grade morons of about 11.5 years, if judged by the Binet Scale alone.

Correlation between the Binet-Simon Tests and other Mental and Physical Tests. EDWARD K. STRONG, JR., George Peabody College for Teachers.

It was found that correlations between Binet-Simon tests and other psychological tests, such as Opposites, Logical Memory, Calculation, Form-Board, Memory-Span, etc., give surprisingly high coefficients. These coefficients average considerably more than between the Opposites Tests and other psychological tests, or, in fact, between any one of the psychological tests used and the other tests.

The coefficients of correlation were based on results from 50 children, all between 10 and 12 years of age, and ranging in general ability from markedly superior to quite dull, but containing probably no defective children. Two separate tests were made at intervals of three and one-half months, thus enabling a correction for attenuation.

These results indicate in a quite surprising manner the value of the Binet-Simon tests, since they correlate so high with the other tests.

M mentality of the Negro Compared With Whites. W. H. PYLE,
University of Missouri.

In this study, certain standard group tests were given to 408 negroes in the public schools of Columbia, Mexico and Moberly, Missouri, and the standing of the negroes compared with that of whites of the same age. Some of the more important results and inferences are as follows: The marks made by the negroes in the various tests are, in general, about two-thirds of the corresponding marks of whites. Negro girls are closer to white girls than negro boys are to white boys. Negro boys and negro girls are farther apart than are white boys and white girls. Negro girls are superior to negro boys as is the case with whites. The difference between negroes and whites grows less with age. About one-fifth of the negroes are equal or superior to the average of whites, while three-fourths of the whites are equal or superior to the average of the negroes. In the more difficult tests, the difference between negroes and whites is greater than in the easier tests. In controlled association and the Ebbinghaus Completion test, the average of the negroes is less than half the average of the whites. While in the free association and ink-blot tests, the negroes are nearly as good as the whites.

Separating the negroes into a poor and good social group and comparing the two groups shows that the negro boys of the good group make an average which is four-fifths of that of whites, and the girls, three-fourths of the average of white girls. Difference in social position has more effect on negro boys than on negro girls. The effect of social position is shown more in quickness of learning, controlled association and in the immediate and permanent logical memory tests. The good social group stands about midway between the poor group and whites.

The Standardization of Knox's Cube and Feature Profile Tests.

RUDOLF PINTNER, Ohio State University.

The Cube and Feature Profile Tests of Knox, used by him in the mental classification of immigrants, have been somewhat changed and have been given to about six hundred normal children of varying ages and to about six hundred feeble-minded individuals classified according to mental ages. An attempt has been made to standardize the various lines of the cube test, and to find out at which ages a large percentage of normal children were successful in the different steps of the test, which gradually increase in difficulty. In this way three or four groups of lines of the test seem to have proved themselves good tests for specific chronological ages. The Feature Profile Test, a test of the form-board variety, was accomplished by a large majority at age eleven, and would seem to be a good eleven-year-old test.

A comparison of these results with the results obtained from feeble-minded individuals arranged according to Binet ages shows some interesting divergences. The normal children on the whole do better on the Cube Test than feeble-minded children of the corresponding mental age, suggesting that the Binet scale may be too easy in some respects. In the Feature Profile Test the feeble-minded of the higher ages did better than normals of the corresponding chronological age, whereas the feeble-minded of the lower ages did poorer than the normals of the corresponding chronological age.

The Value of Anthropometric Measurements in the Diagnosis of Feeble-Mindedness. E. A. DOLL, Vineland Training School.

Goddard and Mead have demonstrated that the feeble-minded of all grades are below normal in height and weight, with greater abnormality in the lower grades than in the higher. The present study is an analysis by exact mental ages of psycho-physical measurements (right grip, left grip, vital capacity) as well as physical (standing height, sitting height, weight), based on data from 490 feeble-minded boys and 185 girls of all ages and grades. The analysis by mental age is made possible by comparison of the data with Smedley's percentile tables, thus eliminating chronological age by use of age-percentiles. These percentiles are averaged for each measurement, for the averages of the physical measurements, the psycho-physical, the total, and the excess of physical over psycho-physical. From these computations definite positive corre-

lations are found between mental age and all measurements. The specific character of the anthropometric "curve" is typical, and has a highly diagnostic value, the slope in particular being very highly correlated with mental defect of all degrees. Specific relationships between the several measurements and for the sexes are apparent; boys are more variable than girls, psycho-physical measurements are more variable than physical; no relation is established between variability and degree of defect. Psycho-physical measurements are much more below normal than physical, and more highly correlated with mental age. Boys are more below normal than girls in all respects except vital capacity. Weight shows the least retardation and vital capacity the most. Sitting height is more abnormal than standing and right grip more than left. The measurements hold their diagnostic value for a special group of feeble-minded cases which did not show complete feeble-mindedness when first examined, as well as for a group of normal subjects. In no case except weight for girls do as many as one fourth of the cases reach the normal average in any of the measurements. Without exception the individual "curves" for all girls slope downward, and for boys only 2 per cent. fail to slope downward, and in half of these 2 per cent. the physical average is very far below normal.

A Study in Mental Retardation in Relation to Etiology. BIRD T. BALDWIN, Swarthmore College.

The paper gives the results of a consecutive study in mental retardation and formulates a method of approach into this field of investigation from the *psycho-etiological* point of view through the presentation of physical characteristics and anthropometric measurements; pathology and treatment; systemic diagnoses—including blood counts with differential color index, Wasserman test, blood pressure and urinalysis; physical tests—for reflexes, nerve tension, strength, acuity of senses, hyperesthesia and paralysis; mental tests—for time reaction, motor coöordination, habit formation, instincts, emotion, perseverations, intelligence, learning; pedagogical advancement and improvement in self direction.

MISCELLANEOUS STUDIES

Some Relations of Mania to the Sensorium. E. E. SOUTHARD, Boston Psychopathic Hospital.

Mania, as conceived by modern workers, tends always to entail what Wernicke has called hyperkinesis. It might be natural to

seek for the sources of hyperkinesis in the kinetic brain-mechanisms. In point of fact, however, various better-known conditions of hyperkinesis, such as epilepsy and chorea, are often found related with lesions in various parts of the sensorium and may even require a certain integrity of the kinetic apparatus. A brief review is given of the reader's work showing the relations of hyperkinetic symptoms to certain lesions of the optic thalamus. New work is adduced concerning the association of mania with irritative lesions of the hinder part of the cerebral cortex (sensorium). Some other arguments are presented for the sensorial origin of hyperkinetic symptoms and for the peculiar value of the intaking nervous mechanisms for the so-called behavior-psychology.

Variations in Distribution of the Motor Centers of the Monkey Brain.

SHEPHERD IVORY FRANZ, Government Hospital for the Insane.

A special investigation of the distribution of the motor areas for the arm and leg segments in the monkey brain gave results which show a considerable individual variation in (1) the absolute extents of these areas, and (2) the relative extents of the areas for the individual segments. Furthermore, on the two hemispheres of the same animal variations in the distributions were discovered. These facts, with other allied clinical and physiological results, point to an interpretation of cerebral function in which the conception of a normal physiological variability plays an important part.

Notes on Affective Physiology. GEORGE VAN NESS DEARBORN,
Tufts Medical School.

For scientific technical purposes, the conceptual division of emotional behavior potentially into eighty or more feelings and emotions should be abandoned as only traditional, thus clearing the way for adequate study of the complex basal oppositions which biologically underlie, the chief of these oppositions being that between (vegetative) impulse and (personal) control. It is an adequate thesis (for proof or disproof) that the energy-aspect of feeling consists especially of numerous sets of kinæsthetic neuro-kinetic impulses or strains which continually relate all layers of the great cortex to its ever-unique effective environment, the conscious inhibitory phase of the kinæsthesia representing originally, in the infant, the feeling unpleasant in tone, and its subconscious actuating phase the pleasant emotion. The actuation of movement, bodily and therethrough mental, in the naive, unfatigued and normal individual is primal and enduring delight of all his experience.

In such a personality the inherent impulse to movement in space and in time seems to be represented neurally by the actuating phase of kinesthesia pleasant in tone whenever it rises out of the subconscious. In such a personality, too, the human restraint of impulsive movement in emotion seems to be represented by the unpleasantly conscious inhibitory phase of kinesthesia. Organic evolution is an ever-complexifying process of control over impulse. In the triple intricacies of the great cortex is the only adequate integrating mechanism for that particular physiologic balance which is concomitant, on the usual symbolic plan, to feeling. As the child develops its personality properly human, a double kind of submergence seems to occur: figuratively, a submergence of unpleasantness in some cases into an habituated subconsciousness, and literally, perhaps, a submergence of neuronal motor control from the neopallium into the deeper layers of the cortex, the archipallium. This universal process in no way invalidates the kinesthetic theory of feeling, since it leaves undisturbed the original primary influence on the autonomic and spinal greys as well as the secondary resultants therefrom into the cortex by way of the distributing thalamus.

Some Technical Results of the Alcohol Program. RAYMOND DODGE,
Wesleyan University.

Quite apart from their indications as to the effect of alcohol, which it would be inexpedient to touch upon in the time at our disposal, the first year's experiments, under the Alcohol Program of the Nutrition Laboratory of the Carnegie Institution, give data for a critical re-examination of the practicability of the principles on which the research was based, and of the relative value of the various neuro-muscular techniques. There were three fundamental principles on which the measurable phenomena were selected, which involved a conscious departure from traditional usage in food and drug experiments on man. (1) The first principle was to secure comparable measurements of a group of neuro-muscular processes which are systematically related according to some psycho-physiological plan. At the end of the experiments, the results ought to be capable of systematic coördination on some known psycho-physical basis. (2) The Principle of Relative Simplicity demanded that we measure elementary neuro-muscular processes in their simplest available forms, and choose the more complex processes so that they involve as few unknown factors as possible. This

principle led us to commence with the simplest reflex arcs, as a basis for interpreting the more complex; to measure the sensory threshold to faradic stimulation in preference to that of senses with complex adaptive mechanisms; to measure by preference those processes that are relatively free from direct or arbitrary voluntary control of the subject. (3) The Principle of Customary Reaction required that the subject's response should be a thoroughly natural and familiar one. All three principles have been justified by the results. We have consistently comparable data from a wide variety of completely untrained subjects. The effect of repetition is small. With respect to the reliability of the different measurements as indicated by their variability, there are wide variations. With respect to the value of the various processes, as general indicators of the position of the individual within the group, it appears that coördination processes are more significant than the reaction processes. The most valuable of our measurements is the velocity of the eye movements.

The Effect of Heat, Humidity, and Stagnancy of Air Upon Mental Work. EDWARD L. THORNDIKE, Teachers College.

Our college students, when confined during four hours in a room with the temperature at 86 degrees F., the relative humidity 80 degrees, with no motion of the air save that caused by their own movements, and with the ingress of air reduced so far as possible, so that the CO₂ rose from 3 to 40 or more parts in 10,000, could do addition, cancellation, typewriting and mental multiplication (with three-place numbers) as well as under the best obtainable air-conditions. Even in work like grading handwritings or English compositions, where the subject could relax his efficiency without any observable falling below an objective standard (since neither he nor anyone else at the time knew the quality of his product), there was no difference between the best and worst air-conditions. The improvement from practice was equal in the two cases. This work, carried out by the New York State Commission on Ventilation, is now being extended by a study of the effects of long periods of exposure to the bad conditions, and by a study of the effect of the bad conditions upon willingness to do mental work.

Two Cases of Criminal Imbecility. HENRY H. GODDARD, Vineland Training School.

Case I. A sixteen-year old boy murders his former teacher, is arrested, makes a confession, is indicted, and tried for the crime.

The theory of the prosecution: Confession is taken at its full value. Circumstantial evidence is added and although no motive is discovered, the boy is supposed to have committed the deed in accordance with a long planned and well worked out scheme. The theory of the defense: The boy is feeble-minded, not responsible, and while knowing what he was doing, did not know the nature of the deed and the wrongfulness of it. The boy's confession not to be taken too seriously, because he is an imbecile. This fact being recognized, it becomes entirely possible that the whole affair was a sexual matter and thus the motive is supplied and the whole occurrence made at least intelligible.

Case II. A nineteen-year old boy in company with an older man murder an overseer. Motive of the elder man, jealousy. The boy had no motive, but a study of his confession and the circumstances makes it clear that he was acting under the suggestion of the older and stronger mind. Not having intelligence enough to resist, he does as he is told. This illustrates the power of suggestion or influence where a feeble-minded person is concerned.

Both boys had succeeded fairly well in the fifth grade of public school work, but failed absolutely and entirely to be able to do sixth grade work. The Binet examination agreed entirely with this school record.

A New Method of Studying Ideational and Allied Forms of Behavior in Man and Other Animals. ROBERT M. YERKES, Harvard University.

The writer has developed, during the past year, a multiple-choice method of studying, comparatively, ideational and allied forms of behavior in different types and conditions of organisms. The method enables an experimenter to present standardized problems of a wide range of difficultness. Thus far, it has been applied in preliminary studies of the ideational behavior of crows, pigs, normal and defective children, normal human adults, and *dementia praecox* cases. Experiments with rats and ring-doves are in progress. A brief preliminary account of the method was published several months ago, and a more detailed description of it, in the special form in which it has been used with crows, will appear early in 1915.

A Preliminary Report on Number Reactions in the Dog. A. H. SUTHERLAND, Yale University.

The Visual Difference-Threshold for Size in the Monkey and the Domestic Chick. H. M. JOHNSON, Nela Research Laboratory.

Tests were made by the discrimination method on two adult Indian game cocks and one adolescent Cebus monkey. The stimuli were two systems of striae lying in the horizontal direction, prepared by means of two Ives-Cobb visual acuity test-objects. The mean brightness of the two fields was respectively equal: 6.67 candles per square meter in the tests on the monkey and 12.2 candles per square meter in the tests on the chicks. Food and punishment in combination constituted the incentive. The range of stimuli used on the chicks, measured in width in millimeters of each dark and bright band, was from 0.74 (near the stimulus threshold) to 3.12; for the monkey, from 0.17 to 1.78, the smaller value lying near his stimulus-threshold.

One chick failed to learn the problem, being insensitive to size-difference alone and to direction-difference alone, but discriminating when a 30 per cent. size-difference was presented with a difference in direction of 90 degrees. The other chick discriminated until the width-difference was reduced to 30 to 40 per cent. of the value of the standard stimulus. The monkey gave threshold values varying between 2.6 and 15 per cent., the optimum being at 0.3 mm. for the standard. The form of the curve, percentage difference at threshold values being plotted against absolute value of the standard stimulus, suggests more than one criterion of difference, or more than one degree of attentiveness. The mean error of two human subjects instructed to judge when the value of the variable stimulus became equivalent to that of the standard, is of the same order of magnitude as the monkey's difference-threshold, within limits.

A Proposed Classification of Mental Functions. GEORGE A. COE,
Union Theological Seminary.

Functional analysis of mind requires classification of functions just as structural analysis requires classification of elements. Approaches have been made toward a classification of functions: (a) Declarations of the purposive nature of mind, without a list of specific functions (Münsterberg, Ogden). (b) Declarations that all mental functions are "irradiations" from primitive hunger and love. (c) Appending to each item of structure a statement of its function (Angell). Here the list of functions is not based on differences among the functions themselves. Angell's genetic

method emphasizes the *terminus a quo*; functions are to be defined by comparison of *a quo* with *ad quem*. (d) Identification of functions with interests, and of interests with instinctive tendencies. But the resolution of the traditional "instincts" into a multitude of special adjustments (Thorndike) removes the supposed basis for classification. (e) Classifications of value are functional, but not comprehensive of all mind, nor do they ask the fundamental question, which is, In what directions does mind as a whole actually move?

The biological functions of mind are quantitative only; they imply no "better and worse," but only increase in the range of response;—(1) In space; (2) In time; (3) To different magnitudes; (4) To different qualities; (5) In degrees of coördination. Nutrition and reproduction are not functions of mind. Mind moves from them as much as toward them. It does not improve them, but re-directs them, restricting and specializing the objects operated upon, upsetting earlier equilibriums, and increasing the cost.

Mind has also preferential functions, always qualitative, implying "better and worse," and scientifically known by means of communication through language, as in the "order of merit" studies listed by Hollingworth. The preferential functions are:—(1) To be conscious; (2) To multiply objects of consciousness; (3) To control objects, oneself included; (4) To unify objects, oneself included; (5) To communicate, *i. e.*, to have in common; (6) To contemplate (æsthetic function). Play, and noëtic, ethical, economic, and religious value are absent from this list because each is a complex of functions here named. Instinctive needs are absent because mind does not satisfy instinctive desire in its initial form, but modifies the desire itself. Securing pleasures is not a mental function. The distinctive thing that the growth of mind adds to our pleasures is satisfaction in some mentally effected and controlled reorganization of objects, oneself included.

This view of functions does not make them formal and contentless. Minds mutually attaining their own freedom within the world as it is are as concrete as anything can be.

Psychology of Slavic People. PAUL R. RADOSAVLJEVICH, New York University.

An objective study of Slavic national character is indicated by their national poetry. Poets and writers show the following main characteristics: (1) *Slavic Melancholy* is a quiet, sad sigh,

which has nothing to do with sentimentality or pessimism. In very dangerous moments of life a Slav has no anger, no weakness, he is only under the spell of a peculiar sadness, combined with a deep thinking and submission to fate. Such a melancholy preserves order and insures stability of moral equilibrium. (2) *Slavic Suffering* saved Slavs from physical and moral death in the struggle with terrible elements. This highly developed power of suffering, combined with the ability to transform sudden stirrings up of the soul into the quiet feeling of melancholy, enables the Slavs to be great in adverse circumstances and to preserve mental equilibrium in the dangerous days of life. The immediate result of all this suffering is (3) *Slavic Pity, Love and Sympathy* which is the basis of *Slavic Idealism for Humanity*. The humitarian traits of Slavic people have been the subject of study even in ancient times. (4) *Slavic Humility and Patience* is noted as opposed to the haughtiness and aggressiveness of the western European nations. (5) *Slavic Lack of Decision*, lack of conviction, lack of practical force, has the following psychological root: Talk or act in anything only after you have reasoned out well. (6) *Slavic Deep Religious Feeling* is a marked trait shown both in the practical life of the Slavic people, and in the works of such writers as Tolstoy, Dostoyevsky, Gogol, etc. (7) *Slavic Social Ideals* are best illustrated in the Russian communal village, the Servian communal household, or the Montegran brotherhood. On account of this common property Bakounin said that the Slavs are and always have been socialistic. But this socialism is not merely economic, but inspired by high moral and human motives. (8) *Physical Characteristics of the Slavs*. The Slavs were probably never entirely homogeneous. They evidence all varieties in the shape of head, stature and complexion.

A Study of Dreams: A Method Adapted to the Seminary. MADISON BENTLEY, University of Illinois.

Concerning the Religion of Childhood. W. T. SHEPHERD, Waynesburg College.

The paper is a report of a study being conducted by students of Waynesburg College and the writer to ascertain the ideas of children on some of the fundamental conceptions of religion, together with some of the religious feelings of childhood. Under direction of the writer, Mr. J. D. Gold and Miss Erma Tennant collected the data for this advance report of the study being conducted. So far, 25 children have been studied, of 10 to 12 years.

The questionnaire method was employed, and the children cross-questioned in order to get from them as definite expressions of their ideas on the subject as was possible.

Though the cases so far studied are not sufficient to warrant many generalizations the following propositions seem to be inferable: (1) Children of the classes studied believe in a God. (2) Children have two different conceptions of God's nature, (*a*) a spiritual one, (*b*) a physical conception. Some children have no idea on the subject. (3) There are indications that child church members have the spiritual conception of God more commonly than non-members. (4) There are indications that children 10 to 12 are more apt to conceive God as a spirit than Jesus as a spirit. Also that they are more apt to conceive Jesus as a man than in a spiritual form. (5) There are indications that most children of these ages do not fear God. (6) There are also indications that children of these ages prefer Sunday school to church service. (7) Child church members believe they should be better than non-members. Few non-members agree with them in this. (8) Some children ask God for things, and make Him promises, some do not. (9) Fewer children of these ages seem to have an idea of the Holy Ghost than of God and Jesus. Also their ideas are vaguer. (10) The study tends to confirm Starbuck's conclusion that girls are converted at earlier age than boys.

PROCEEDINGS OF THE TENTH ANNUAL MEETING
OF THE SOUTHERN SOCIETY FOR PHILOSOPHY
AND PSYCHOLOGY, PHILADELPHIA, PA.

REPORT OF THE RETIRING SECRETARY, W. C. RUEDIGER,
GEORGE WASHINGTON UNIVERSITY

The Southern Society for Philosophy and Psychology held its tenth annual meeting at the University of Pennsylvania, Philadelphia, Tuesday and Wednesday, December 29 and 30, 1914, in affiliation with the American Psychological Association and the American Association for the Advancement of Science. Two sessions were held, one on Tuesday afternoon and one on Wednesday forenoon, nine papers being presented from the society. The session on Tuesday was held in conjunction with the American Psychological Association. On Tuesday evening the members of the society joined the members of the American Psychological Association in a dinner and smoker at Kugler's restaurant. Upon recommendation by the Council the following items were passed upon at the business meeting held Wednesday forenoon:

1. The place of holding the next meeting was left to the Council for decision. It was decided not to hold a formal summer meeting on the Pacific coast in connection with the Panama Exposition but it was recommended that members attending the Exposition do so as far as possible during the first week of August and participate in the scientific meetings held at that time.

2. The following new members were elected: Miss Jane B. E. Brown, Winthrop College; Professor E. P. Frost, University of Tennessee; Dr. E. J. Kempf, Government Hospital for the Insane; Mrs. Helen Piotrowsky, Kentucky State Normal School; and Judge Thomas M. Shackleford, Tallahassee, Fla.

3. The following officers were elected: President, J. C. Barnes, Maryville College; Vice-President, E. E. Rall, University of Tennessee; Secretary-Treasurer, L. R. Geissler, University of Georgia; Council for three years, D. S. Hill and J. G. Harrison; for two years, T. V. Moore; for one year, E. K. Strong, Jr.

4. The accounts of the Treasurer, which were approved by the Society, showed a balance on hand, December 29, 1914, of \$87.87. Of this amount the sum of \$10.00 was allowed the Secretary-

Treasurer toward defraying his expenses incident to attending the Philadelphia meeting.

5. Pursuant to a resolution adopted the preceding year at Atlanta, Article III of the constitution was amended so as to make the term of office of the Secretary-Treasurer three years instead of one year.

6. A resolution thanking the authorities of the University of Pennsylvania, and especially the members of the psychological department, for courtesies extended, was unanimously adopted. Among these courtesies were not only convenient quarters for holding the sessions but a free luncheon served daily during convocation week.

The following are abstracts of papers presented.

The Temporal Relations of Meaning and Imagery. THOMAS V. MOORE, Catholic University of America.

Subjects reacted on presentation of words and pictures. Both words and pictures designated familiar objects, *e. g.*, tree, lamp, knife. The reaction time was measured by the Hipp chronoscope. Non-sense words and meaningless drawings were used as controls.

Series I. Relation between simple meaning and the visual image of an object designated by a word. In this series the subject reacted: (*a*) to the awareness that the word had a meaning, (*b*) to the awareness of a visual image of the object represented. The "meaning" series with all our subjects were shorter than the "image" series. In most the difference is considerable, for example, M_1 , average of "meaning" series, 571σ ; average of "image" series, $1,523\sigma$. Meaning, therefore, arises under these conditions prior to imagery.

Series II. Relation between the awareness of the purpose of an object and a pertinent kinæsthetic image. The words chosen set were not merely capable of being visualized, but represented objects that most of us have handled, as, brush, bell, hat. To represent a word like lion by a kinæsthetic image is to some subjects a very difficult task. Consequently a more appropriate set of words was chosen. Even under the most favorable conditions, the kinæsthetic image comes far too late to account for the simple meaning. It might be said that it is identical with the consciousness of the purpose of an object. This seems ruled out however by the experimental results. The reaction time shows that with some subjects the consciousness of purpose is distinctly prior to

the kinæsthetic image, for example, subject Mi, "purpose" reaction, 1,315σ, "kinæsthetic" reaction 1,650σ; subject Mr, "purpose" reaction, 817σ, "kinæsthetic," 1,670σ.

Series III. Relation between awareness of the meaning of a picture and the auditory-kinæsthetic awareness of its name. In the perception of image words scarcely any difference in time can be noted between the acoustic motor image given by reading the word and advent of the meaning. With pictures it is different. The meaning comes first. The word distinctly later, for example, subject Mi, "meaning," 657σ, "word," 911σ; subject K, "meaning," 633σ; "word," 922σ.

From a study of the temporal relations of meaning and imagery we find: (1) Meaning comes prior to the visual image; (2) Meaning comes prior to the kinæsthetic image; (3) Meaning in the case of pictures comes prior to the verbal image. Meaning, therefore, cannot be identical with such images either considered in themselves or as accruing to the sensations involved. Meaning in other words must be distinguished from imagery.

The Craving for the Supernatural. TOM A. WILLIAMS, Washington, D. C.

Craving for the Supernatural is partly due to upbringing in "spiritistic" beliefs. But even in the absence of these, bodily sickness creates a state of need which seeks for strength or oblivion without finding relief in an intoxicant. But relief is attempted often by some expedient without any physical effect which gives the victim a feeling that matters gone wrong, as he thinks, will somehow be adjusted in an inexplicable way. For instance, if Friday the thirteenth is avoided or if one puts on the clothing in a particular way, an uncomfortable apprehension of misfortune is neutralized for a time. The cause of this condition may be a physical one. But the origin is often purely mental, as from brooding over ill-understood imaginings. Cases of this kind in children as well as adults were cited to show how the incommoding interpretations are removed nowadays.

The Master Motive in a Theory of Knowledge in the Light of Evolution. JOHN G. HARRISON, Mercer University.

While the historical methods of empiricism, mysticism, and the present pragmatic tendency are valuable, some sort of rationalistic method will ever prove the one for final estimation. Is such a method compatible with an age dominated by the concept of evolution?

A rationalistic theory is often considered antagonistic to empirical science and committed to a universe with no change or life. This has discredited the rigidity of categories, but need not impair their usefulness or finality for evaluation. We now regard thought forms as organs developed in our life struggle. For this reason rationalistic procedure using such thought forms is the master one. As consciousness is the "master device for adapting organism to environment" so reason with necessary forms of consistency, cause, purposiveness, morality, etc., is the master device for adapting self to reality which completes environment. These concepts are co-ercions for us. Hence the finality which must attach to them in the matter of reality.

It may be granted that these thought forms may change, that even another category, that of progress, is likely to assume a permanent place; but they will all still be subjective, that is, modes of consciousness. Reality may be conceived as in progress as matter is conceived in space, but the method of the conception will be rationalistic. This master method will check and test by thought necessities all the experience generated in the interplay organism and environment. This doctrine implies that we do not create truth but have to interpret experience.

All spiritual implications of the most radical intuitionism and transcendentalism are preserved in this sort of a rationalistic theory of knowledge. All the explanatory value of scientific evolution is safeguarded. Whether we are co-creators of the final reality or not, we are certainly creatures with thought necessities which not only show us reality but attest it. The successful concept of morality validates the existence of morality and of its author and end.

Some Psycho-Educational Studies in Retardation. BIRD T. BALDWIN, Swarthmore College.

The paper gives the results of two individual studies in mental retardation which aim to show the limitations of the Binet-Simon scale, and the significance of different levels and irregularities in development due to the lack of educational training and proper home environment.

Subject I is a deaf mute, with a chronological age of fourteen years one month, and a physiological age of fifteen years or over, who had previously been confined to a jail, reformatory school, school for the deaf, and an insane asylum. The subject was tested,

with the aid of an interpreter, by the Binet-Simon scale, which proved inadequate, but indicated that the child was a middle grade moron. Since the parents and the authorities in the various institutions have never been able to communicate except by crude gestures with the child, the case was diagnosed primarily as one of suppressed expression and diffused emotions which resulted in recklessness and malicious mischief as a natural outlet.

An extensive diagnostic study of Subject II, who has a highly complicated and somewhat artificial home environment, revealed a mental age slightly above normal, with good, systematic thinking, good memory, fair constructive imagination, but slow reaction time and marked retardation in instincts and capacities with a pronounced emotional bias, especially in the case of fear. Among the traits particularly retarded are play, constructiveness, coöperation with other children, courage, rivalry, self-reliance and leadership. Careful therapeutic management from the educational point of view through directed and spontaneous play, manual training and school work is resulting in marked improvement.

The Master Aim in Education. JOHN G. HARRISON, Mercer University.

Workers in education should constantly keep clear the matter of aim. The formula which takes content from science, method from psychology, and aim from society, is not satisfactory. Too much method is social, too much aim individual, and truth is too much of an ideal in itself. Any one of the great aims, individual development, pursuit of truth, or social efficiency preserves the others better than any eclectic one. Indeed some single ideal is nearly always adopted by enthusiastic and persevering workers.

All would agree that it is society's duty to educate for society's sake. But the formula is inadequate, since the future society is the one involved in the aim and no one has seen the future society. But, if we take the development of personality as the leading aim, we have on hand in the child the prophecy of the future. History warns of the tyranny of organized society over the potentialities of individuals, chief factors in the social efficiency and welfare of the future.

We need good society. But good for what? The ethical doctrines upon analysis will all reduce this to some sort of an individual good. Education considered as adjustment must be not simply the fitting of the individual to environment, but the modification

of the environment for personal selves. This is the acme of evolutionary morality as well as the goal of education. Activity and efficiency that are social are important functions of the organism. Social individuals are the only ones. But, if the ideal of a full and harmonious development of personality is to be substituted by one emphasizing efficiency, it would seem that something like *evolutionary efficiency* or *efficiency for progress* would better represent what we all mean.

Some Observations on the Intelligence of the Chimpanzee. W. T. SHEPHERD, Waynesburg College.

The paper is a report of some observations made on the chimpanzees Peter and Consul, two stars of the vaudeville stage. The observations of Peter included seeing him in two performances on the stage and one private examination of him by the writer. The observations of Consul consisted in seeing him perform once on the stage and one private examination of him. The feats performed by both apes which were observed include: Eating at a table, riding a bicycle, riding between bottles on the stage, riding up an inclined plane, and other acts requiring a similar capability in the animals. The acts done by Peter only included driving a nail with a hammer, a correct attempt to open a watch upon seeing the writer do so, writing letters of the alphabet, articulating a word, and some other feats. Feats performed by Consul only included: threading a needle, writing on a typewriter, boring with an auger, locking and unlocking a padlock, etc.

The writer concludes (1) that the above mentioned feats of the apes, apparently showing superior intelligence in them may be accounted for principally by *a*, their superior motor-equipment, *b*, training, *c*, their semi-erect carriage. (2) There are some indications of learning by imitation. (3) There are indications of crude ideas or of reasoning of a lower order. (4) There are indications of more human-like emotions in apes than in such lower species of monkeys as the Rhesus. (5) These and similar apes are the most intelligent sub-humans of which we have knowledge.

Correlations between Cranial Measurements and College Marks. W. C. RUEDIGER, George Washington University.

The Pearson coefficient of correlation was determined between college marks and various physical measurements, mostly head measurements. The head was measured in centimeters with a

tapeline in (1) circumference, over the (2) lower and the (3) upper forehead, over the top at the (4) front, (5) middle, and (6) crown, (7) around the back, and (8) from the root of the nose over the top to the back. The subjects consisted of 85 college students, 35 men and 50 women. The correlations for the men all hovered about 0 while those for the women averaged .28, the highest being .38 for the circumference and the lowest .22 for (3), (4) and (8). For the women a correlation of .40 was found with the length of the nose, and .21 with height. The measurements of 15 men and 14 women were repeated and the correlations of these with the first measurements varied from .39 to .99, being lowest for (8) and slightly lower for the women than for the men.

Some Points of Likeness and Difference in the Philosophical Systems of Augustine and Descartes. MARGUERITE KEHR, University of Tennessee.

A fundamental difference in the natures of Augustine and Descartes is found in their estimate of the relative importance of religion and philosophy. In spite of this difference, the two thinkers make the same truth the basis of their philosophical systems. Both argue that we can be certain of our own existence because the possibility of being deceived implies the existence of the one deceived, and because doubt proves the existence of the doubter. When we leave this fundamental doctrine and study its implications, differences are at once evident. This is true of the teaching of Augustine and Descartes concerning the existence of God, the nature and existence of the world, the origin of evil, and the problem of freedom. Initial agreement and subsequent disagreement, difference in the nature of the two thinkers, and in the times in which they lived, indicate the power and stability of the argument for the existence of the self as the basis of philosophical thinking.

On the Study of the History of Ideas. A. O. LOVEJOY, Johns Hopkins University.

THE PSYCHOLOGICAL BULLETIN

THE SEQUENCE OF TOPICS IN BEGINNERS' PSYCHOLOGY

BY L. W. SACKETT

University of Texas

The most obvious part in the modern teaching of psychology noticeable even to the casual observer is the variation in the sequence of topics presented. There is little uniformity of sequence, writers or teachers choosing their own arrangement to suit their own private purpose, or, seemingly, with no clear purpose at all. Some even entertain a mean opinion of the question of sequence. Such a general and rather superficial observation led to an effort to determine what the exact facts are concerning the sequence of topics. A canvass of a score or more of elementary text-books was made. This emphasized the fact that writers viewed the subject from widely different angles. Most texts treat of the same topics but no two texts have the same order and only in a few cases was the sequence found to harmonize for more than three successive topics. The method of recording and tabulating these data was as follows. First, an arbitrary order of topics was chosen. This order may have some merit in itself but no defense of it is made in this study. Its general form was borrowed from a colleague (Prof. A. Caswell Ellis), was modified in some respects to suit external conveniences and has been used with considerable satisfaction for several years. However, in this study it is to be considered only an arbitrary order. Second, the orders in which these same topics were introduced in the text-books were tabulated. Considerable difficulty was experienced in doing this. The complex interlockings of the discussions made it necessary in some cases to give two topics the same ranking. In some such instances the rank is in a fractional

position. In other cases it was difficult to make a choice between two widely separated presentations as to which should be considered the adequate initial discussion. Where a topic was not discussed by an author it has been indicated by an X and the topic immediately following it in the arbitrary order has been raised one rank and all numbers above it correspondingly raised. For ex-

TABLE I

	Association		Memory		Imagination		Apperception		Perception		Conception		Sensation		Nervous System		Discrimination		Judgment		Reasoning		Habit		Interest		Attention		Emotion		Instinct		Inhibition		Suggestion		Will		Self	
Arbitrary..	I	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20																				
Angell.....	9	10	8	6.5	6.5	11	5	1	4	12	13	2	14.5	16	18	3	14.5	X	17	20																				
Calkins....	II	92	6	X	5	13	2.5	2.5	X	15	16	8	7	17	X	10	9	X	20	1																				
James.....	8	10	II	12.5	12.5	6	1	2	7	X	15	3	17.5	16	9	5	17.5	X	20	4																				
Judd.....	10	II	12	X	3.5	5	3.5	1	X	15	16	8.5	8.5	17	X	7	12	20	19	18																				
Pillsbury...	6	9	10	X	8	11	3	1	X	13.5	13.5	2	15	17	5	4	16	X	19	20																				
Titchener																																								
Pr.	7	II	12	5	6	16	2	1	X	14	15	8	10	9	X	4	X	20	18	17																				
Titchener																																								
Text....	8	9	10	7	6	16	2	1	17	18	19	5	13	15	X	4	X	II	14	20																				
Thorndike..	I3	14	4	X	3	5	1	9	12	6	15	II	10	7	19	8	X	17.5	17.5	16	X																			
Ebbinghaus	I	10	5	12	II	4	2	X	16	16	16	X	20	9	8	13	X	7	18	19	X																			
Bolton.....	5	4	10	II	9	5	8	1	X	14	14	3	16	17	X	7	X	3	18	17	15	X																		
Halleck....	8	7	9	5	6	10	4	1	X	12	13	19	16	14	X	3	X	13	15	17																				

TABLE II

	Sensation		Nervous System		Habit		Self		Attention		Conception		Discrimination		Association		Interest		Memory		Imagination		Apperception		Perception		Reasoning		Emotion		Instinct		Inhibition		Will		Self	
James.....	I	2	3	4	5	5	6	6	7	8	9	10	11	12	13	14	2	3	4	5	10	13	12	16	17													
Arbitrary.....	7	8	II	18	15	15	6	9	1	14	2	12.5	12.5	12.5	12.5	12.5	6.5	6.5	6.5	6.5	12	15	13.5	13.5	16													
Angell.....	5	I	2	18	3	11	4	9	9	17	10	8	8	6.5	6.5	6.5	6.5	6.5	6.5	6.5	12	15	13.5	13.5	16													
Calkins.....	2	2.5	8	I	11	14	X	12	X	13	6	5	16	17	17	17	17	17	17	17	17	7	9	18														
Judd.....	3.5	I	7.5	16	6	4	4	4	4	4	4	4	9	X	10	12	X	3.5	3.5	3.5	15	15	13	7.5	11	17												
Pillsbury.....	3.5	I	2	18	4	11	X	12	X	13	6	6	9	10	10	10	10	8	8	8	13	16	14	15	17													
Titchener, Pr.	2	I	8	16	4	15	X	7	5	11	12	5	6	14	14	14	6	6	6	14	9	10	X	X	17													
Titchener, Text.	2	I	5	18	4	15	X	7	5	11	12	18	13	4	3	3	14	6	9	17	14	12	X	X	13													
Thorndike.....	I	8	10	X	8	X	X	X	8	X	X	I	9	10	5	12	II	15.5	15.5	18	9	17	15	17	15													
Ebbinghaus.....	4	2	X	15.5	8	X	X	X	15	X	5	17	4	10	II	9	9	6	12	13	15	15	15	15	15													
Bolton.....	8	I	X	X	X	X	X	X	10	X	8	X	7	9	5	6	12	13	15	17	3	7	18	18	18													
Halleck.....	4	I	18	X	3	10	X	8	X	7	9	5	6	12	13	15	17	17	17	17	17	17	17	17	17													

ample, Thorndike treats perception as a second topic, but as he gives no discussion of apperception, perception is given third instead

of second rank and imagination is given fourth rank although it is really the third topic discussed. Table I represents a part of the results of this survey.¹

It was feared, however, that the order chosen had in some manner predisposed the order to vary by wide reaches, and consequently the data were re-tabulated with the order in James's *Psychology (Brief Course)* as the basis for ranking. (See Table II.)

So significant were the results of this preliminary survey that a questionnaire was sent to teachers of beginner's psychology in the United States. Reactions were obtained on various aspects of the subject among which was the order of topics which was thought best by each teacher. Thirty-seven replies were received which gave complete answers to questions or contributed to certain aspects of the discussion. These are well distributed geographically and are representative of the teachers of pure psychology in most of the better colleges and universities. The questionnaire was as follows:

1. What text-book in psychology do you use, or would you recommend for a beginner's course for college students?
2. What change, if any, do you make or would you recommend in the order of topics in the text when presenting them to a class?
3. What circumstances would lead you to change from one order of sequence to another?
4. What is your most fundamental definition of psychology?
5. To what extent and in what way does your definition of psychology influence your point of attack and your subsequent order of topics?
6. Criticize the following order and re-number in what you consider a more logical arrangement: 1. Introduction. 2. Association. 3. Memory. 4. Imagination. 5. Apperception. 6. Perception. 7. Conception. 8. Sensation. 9. Nervous system. 10. Habit. 11. Instinct. 12. Feelings and emotions. 13. Interest. 14. Attention. 15. Imitation. 16. Suggestion. 17. Will. 18. Personality, or The Self.
7. Explain fully your disposition of the nervous system.
8. Where would you put discrimination, judgment, and reason in such a sequence as you give?
9. Need the sequence of topics of elementary psychology as a pure science be different from that of psychology as a practical science (*i. e.*, educational)?

¹ For much of the labor of working up and checking details of this study the writer is indebted to his pupils, especially to Mr. E. D. Jennings and Miss Marguerite Jenks. Selected texts referred to in tables I and II are: Angell: *Psychology* (1908); Calkins: *Text-book* (1912); James: *Psychology (brief course)* (1892); Judd: *Psychology* (1912); Pillsbury: *Essentials* (1911); Titchener: *Primer* (1899); Titchener: *Text-Book* (1910); Thorndike: *Elements* (1907); Ebbinghaus, *Psychology*, Trans. (1908); Bolton: *Principles of Education* (1910); Halleck: *Psychology* (1895).

10. One teacher works from the viewpoint of the science as a logically organized body of knowledge, another, from the viewpoint of the student's approach to the subject. In what way should the order of sequence of topics differ?

The object of question 1 was to call a partial roll of teachers to see what books are in common use. Three books were found to be most commonly mentioned, being mentioned eighteen, fourteen and ten times respectively. Fourteen other texts were referred to and were given a total of twenty votes. Many expressed dissatisfaction with all texts. One says, "I can recommend none. I use . . . with an extensive syllabus." Another confessed to have used a different one every year and found none satisfactory. One man of considerable experience writes, "Using . . . in one class, . . . in another, with . . . as supplementary text for both. Prefer . . . but far from satisfied with it." Another says, "I have come to believe that no text-book yet published has presented the subject in the best way for beginners." Another prominent man writes, "If you want my candid opinion I would say that I would chuck the whole lot somewhere in the middle of the Atlantic ocean and start over again." As no special comparison or estimation was called for, these expressions may be taken as an indication of marked unrest among teachers. Only one person expressed himself as perfectly satisfied.

Question 2 relates to the shifting of the order of the topics in the text. The whole question of pedagogical advisability of changing the order of chapters from what an author has in his book is open to serious question. This fact was recognized by some, but many indicated fundamental changes in their answers to the question. Three expressed themselves as satisfied with the order in one text, four with the order in a second text, and four with the order in a third text—naming respectively the three most popular texts. One would "begin with a study of the nervous system and then present sensation, imagination and higher thought processes." Another would "begin with the fundamental instinctive impulses to which the cognitive aspects are guides" (whatever those impulses are the writer is in doubt), and would "greatly reduce the time given to the nervous system." One prominent writer and teacher goes through first in the author's order so that students will get a grasp of the whole with each part in place and then in a thorough review organizes the matter into what seems to him a logical unity.

The returns represent all aspects of a very chaotic situation.

Fortunately, this was anticipated and some light has been thrown upon the causes of this diversity of usage. Though the returns in this regard are not as complete as would be desirable, yet they are very illuminating. One teacher shifts the order because he is out of sympathy with the biological point of view of his author. Four think the ability and preparation of the class might justify or prohibit any shifting of the order of the text. Others answered generally by saying, "get topics naturally related," "place the psychological ahead of the logical consideration," "get it based on the functional conception," etc. Another wishes to avoid the primacy position of the discussion of the nervous system so as to "prevent the student from thinking that the mind is nerves," or as another says "it is so nearly impossible to lead the students to psychologize after they have formed the habit of physiologizing." Throughout, there is manifest this sharp line of cleavage on the place for introducing and the relative amount of time devoted to the study of the nervous system.

Questions 4 and 5 sought a statement of the most fundamental definition of psychology to see how this, as a personal point of view, influences the way in which the work is begun and the subsequent order of topics. Returns in this case are very satisfactory but very difficult to present in a brief way. Those who define in terms of mental processes are about as numerous and as insistent as the behaviorists. Some formulate definitions which seem to evade or bridge over the troublesome line of cleavage with the result in most instances of vagueness and indecision. Sometimes mental processes are limited to the conscious field and behavior to that of conscious guidance. The following are selected as some of the best definitions obtained: "Science of human behavior," "Human consciousness viewed both structurally and functionally (behavior)," "A description of the movement of consciousness," "Science of individual experience," "The nature and structure of that which controls reactions and how it acquires this control," "Science of human behavior inclusive of the mental processes." What teacher has not encountered confusion of definitions and terms when he has induced his students to read widely on the subject in hand? There is in this array a hint of the reason for the many pages of useless quibbling in psychological periodicals and the feeling of despair which follows so many national meetings of psychologists. How could one hope for agreement or even a degree of uniformity in other aspects?

Interesting light is shed on the situation by the opinions of these

teachers as to how much the definition influences the point of attack and the sequence of topics. Presumably, the most fundamental definition would indicate this point of view. If this is a determining factor, how definite is it and what is the proper sequence from each viewpoint? As would be expected, those who define in terms of nerve elements begin with a study of the nervous system in considerable detail, and each admits his definition determines that precedence but when one of these undertakes to formulate sequence in answer to the next question he fails and adds a note: "One can answer this only on the basis of a completed psychology. I doubt if anyone is qualified to answer the question definitely." One who has the mental process point of view denies its influence: "Point of attack, probably not at all, and order of topic, not at all." He then makes the following recommendations for sequence: Habit, nervous system, sensation, attention and interest, perception and apperception, association, memory, imagination, conception, feelings, instincts, emotions, suggestions, will and self. Another with the same point of view starts with self, suggestion, imitation, etc., which is almost the reverse order. Without exception those who define in terms of consciousness claim that it leads in the beginning into a study of the nervous system, with sensation, habit, perception and instinct coming early. Their reasons are the conventional ones based upon their conception of psychology as an organized, systematized science which must be rooted or objectified in the meshwork of nerves. One behaviorist is also induced in a "fundamentally important way" by his point of view to begin with a thorough knowledge of the nervous system. Another would introduce sensation, nervous system, habit, attention, etc., leaving instinct and will till much later. Most of the others begin with instinct, "the basis of all forms of adjustment," pass over or minimize the nervous system, passing on to habit or attention, or emotion, or sensation, or association, or perception, etc., each in his own way to the end of the course. The general conclusion is that so far as the returns show there is just about as much conformity among those who do not have the same point of view as among those whose fundamental conceptions and view-points are similar.

Next in order are the various sequences which these people propose as desirable. Results are placed in a true ranking as in the case of text-books. The arbitrary order does not seem to have determined the recommendations. Table III shows the variety of arrangements. Before entering upon any detailed interpretation,

however, some interesting facts should be presented upon the censoring and combining of certain topics in the list submitted. Seventeen recommended changes of this character. Five censored apperception outright, four combined it with perception, three recommended that it follow perception, while the others gave it independent positions later in the course. Will was censored by three, while one would base the whole discussion on will. Sensation and the nervous system were censored twice each. Perception was made a part of memory once and of association once, in addition to the above grouping with apperception. Instinct was grouped with

TABLE III

	Association	Memory	Imagination	Apperception	Perception	Conception	Sensation	Nervous System	Habit	Instinct	Emotion	Interest	Attention	Imitation	Suggestion	Will	Self
Arbitrary No.	I	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	4	9	8	7	6	10	2	1	3	12	13	14	5	11	15	16	17
" 2	7	12	11	7	7	13	7	8	7	2	14	16.5	4	2	2	X	16.5
" 3	6	8	9	5	7	10	2	1	11	12	4	13	3	15	6	14	17
" 4	7	8	9	5	4	10	3	1	11.5	11.5	13	X	6	X	17	2	
" 5	5	12	11	9	8	10	7	1	4	2	13	14	6	3	15	17	16
" 6	4	7	8	3	6	9	5	1	11	12	10	14	2	13	15	17	16
" 7	6	12	11	9.5	9.5	13	3.5	1	5	2	3.5	15	16	7.5	7.5	15	17
" 8	X	X	12	4	6	5	7	X	9	13	14	3	2	X	X	17	1
" 9	X	6	7	X	4	8	2	1	X	X	11	X	X	X	X	16	17
" 10	11	10	9	X	8	12	6	1	3	2	13	X	5	X	X	17	14
" 11	8	9	10	5	4	11	2	1	3	13	12	7	6	14	15	16	17
" 12	7	6	5	X	4	8	1.5	1.5	15	15	10	11	12	14	13	16	17
" 13	8	10	11	13	9	12	3	1.5	6	7	4	1.5	5	14	15	16	17
" 14	8	3.5	9	X	11	13	10	X	3.5	1	12	6.5	6.5	X	X	X	17
" 15	7.5	9	10	X	7.5	11	3	1	2	12	13	X	5	X	X	16	17
" 16	8	9	10	7	6	11	5	2	1	13	12	3.5	3.5	X	X	X	17
" 17	8	6	7	9	5	10	1	2	3	11	13	15	4	12	14	16	17
" 18	7	8	5	4	3	9	2	1	13	10	11	12	6	15	14	17	16
" 19	11	12	13	15	14	16	9	10	8	6	7	5	4	3	2	17	1
" 20	12	17	15	X	16	X	X	X	7	1	2	3	8	X	10	13	14
Total Av.	18	19	20	14	20	19	19	17	19	19	20	16	19	12	13	17	20
rank	7	9	11	6	5	14	2	1	4	8	12	10	3	13	15	17	16
M.V.	1.6	2.2	1.8	2.7	2.4	3.0	2.1	1.6	3.6	4.5	3.2	4.8	3.2	4.2	4.1	0.9	3.6
rank	2	6	4	8	7	9	5	3	12	16	11	17	10	15	14	1	13

imitation three times and with emotion twice. Other combinations are interest and attention, sensation and nervous system, with habit and perception, conception with association, memory with association and with perception. All of these as well as others not mentioned are reasonable and possibly justifiable, but the lack of

correlation is still marked. There are a few prominent nodes but the most apparent feature is the diversity of the recommended sequences.

In the last three lines of Table III are shown the average ranking given to each topic, the mean variation of the judgments and the ranking of these variations. Perhaps, no individual would approve of the average rank and the figures show only the general tendency to give an early or late treatment and the degree of agreement between the judgments. Thus interpreted the figures would mean that there is some agreement that will should come late, that the nervous system should be treated early, but slight agreement on the early introduction of habit, etc.

Of twenty-nine replies to question 9, whether there should be a difference in sequence in elementary courses in pure and applied psychology, fifteen answered "No!" with a bold hand, six, "Do not think so," others "Think not," "Not materially," "Not necessarily, but probably would," while only one answered "Yes" and straight-way disclaimed the right to an opinion in educational psychology. So here is one thing on which there is practically unanimous agreement as far as the returns go. Personally, the writer has a very strong conviction that the one is right and the twenty-eight are wrong, and so with a veritable abandon of confusion the reported verdict is rejected. Even at the risk of being alone in the contention it is urged that educational psychology even with beginners should begin at a different point, proceed in a different manner, and have a materially different content from that of psychology as a pure science.

Twenty-three ventured an answer to question 10 on the conformity of sequence when the viewpoint was that of the logically organized science and when it was that of overcoming the student's difficulties in his approach to the subject. Eight think the order should be different, while nine would not make any difference. Six were somewhat non-committal or ambiguous. The question is faulty in that it assumes there would be a difference. Such an assumption might predispose even psychologists to accept the assumption and discuss it. It is not known that this really was the case. More than one reply showed clearly the difference without indicating what the order would be in each case. Several think that if there is to be a difference the latter condition should prevail and determine the sequence in order to secure economy of instruction. Another teacher is sure there would be no difference if we accept the behavior point of view. Nearly all of those who see no

distinction of sequence wished the pupils' approach to determine the one order used for both, but an equally eminent scholar answers: "None—always put first things first," which implies just the opposite from the above. Another thinks that if psychology is a science, it must be explained as a science and the pupils' difficulties recognized in the illustrative material. Another, evidently a pragmatist, would change the logical organization if it did not work best as now organized, the test being whether it can be taught. As these returns are mainly from teachers of pure psychology, they may be expected to be very diverse and somewhat unreliable as regards the applied phases of the subject.

As to the proper placing of discrimination, judgment, and reasoning, twenty-five answers were received. Nine of these would put the group near the end of the course with reasons generally assigned that these topics are more abstract, more difficult, less important, etc. Seven of the remainder would place them in sequence following conception which itself is given an average ranking of 10.1. Others would take them up after perception, between memory and feeling, after will, before will and so on. Still others would break up the group placing discrimination with association, or attention, or perception, while judgment and reason would be taken up with the conceptual or volitional material. No conclusions can be drawn. The position in the arbitrary order is even admittedly out of sequence.

Probably no topic shows more divergent views than the proper disposition of and relative emphasis on the nervous system. Some expressed their views in giving reasons for shifting the order of chapters in the text. Sixteen of the correspondents would introduce the topic early but the amount of attention would range from two periods to six full weeks. Some confessedly introduce it early because it can not be prescribed as a prerequisite and they feel the need of it as a basis of discussion. Another sets the topic for desultory reading and takes up a detailed study later in the course. Others begin with it in considerable detail both as gross and microscopic anatomy. There seems to be a disposition on the part of many to reduce the discussion to a minimum, with the reflex arc and a simple statement of the cell energy and synaptic theories of discharge as that minimum. The rough geography of localization and the structure of certain sense organs are studied as correlations of other topics.

Another means of showing the lack of agreement is to take any particular topic, such as association, and observe what precedes and

what follows it in the text-books. For instance association is found in eleven texts to be between interest and nervous system, memory and imagination, interest and apperception, perception and habit, discrimination and interest, etc., no two groupings being the same (see table I). Ten different topics immediately precede association and seven different ones follow it. Add to this the disparate groupings found in the recommendations of teachers as follows: Introduction and memory, memory and sensation, attention and memory, attention and imagination, suggestion and will, etc. (see table III). From thirty sources we find twenty-seven different recommendations. This and the following cases must be qualified by the fact that in the teachers' arrangement of sequence the topics discrimination, judgment, and reasoning did not appear.

The case of attention is not more uniform. Attention in the texts stands between self and conception, habit and discrimination, sensation and interest, emotion and nervous system, etc. Here again no two agree. Add to this the groupings found in the recommendations of teachers and again in thirty judgments there are twenty-eight different recommendations. Other topics show equal diversity of groupings.

Recapitulating, it is found that association is judged proper to follow fifteen of the twenty-one topics used in the outline, and fourteen of the topics may appropriately follow it. With attention there are fifteen topics recommended to come before and sixteen to follow it. It would appear from all of this that if each had tried to select a sequence which no other would approve of there would have been no more lack of harmony.

It is fairly obvious from this array of facts, that psychologists and teachers of psychology must admit a woeful lack of exactness in their science or confess negligence in giving it its merited organization. As to the first point it is frequently claimed that psychology is a unified formative science any aspect of which will serve as an introduction to the remainder of the subject. Such a claim, it seems, can be substantiated for physics and to a degree for chemistry and biology, each of which is a specialization from the older natural philosophy courses, but it is not certain that it is true of psychology. Each of the physical sciences rests upon its own principles with its own complement of facts and laws. The older teachers of natural philosophy before its disintegration could, no doubt, present their subject from almost any angle of approach. It was the mother of many specialized physical sciences. It is, of course, dangerous to reason by analogy, but in regard to the flexi-

bility of approach, the similarity between natural philosophy and mental philosophy is clear. Natural philosophy has been broken up into many definite sciences and is destined to still further division. Mental philosophy has changed its name to one of more orthodox origin without material change in its content. There is a prospect in recent months of a divorce of the subjective from the behavior aspects, an accomplishment highly desirable it would seem. Possible there can be no hope for better uniformity until some differentiation takes place.

The purpose of this paper has been to present the facts of the manner of approach and sequence of topics as they now exist in introductory text-books and in beginners' classes, without discussing the reason for certain topics having any special order of sequence. The conventional rubrics are employed but the data lack definiteness in that even the familiar terminology has widely different connotations for different writers and teachers. In so far as possible this has been taken into consideration in indicating the relative position in the text-book order. It is acknowledged, however, that the illustrative materials may be so selected as to give a degree of unity and rationality to each of the orders of presentation in the text-books where no uniformity is apparent. Probably this is even more easily accomplished by teachers than it is by a text-book author. While there seems to be no justification for the extent of the disagreement found, it must be remembered that the real may be more than the apparent uniformity. But, when all this is considered the conclusion is urgent that the field of psychology is ready for disintegration and specialization and that there must arise a group of new definite sciences from the wreckage of mental philosophy. Is it not time and is it not possible to run certain fundamental boundary lines and allow each man to stake out and work his own claim? It does not seem necessary or advisable for any one to scuttle the old craft in mid-Atlantic before he has another craft, or at least some life-belts, conspicuously displayed. Why waste time and energy in useless efforts at mutual annihilation? Better resort to divorce proceedings and have done with the dissipating bickerings. The topic of mental philosophy as a whole might even remain the punching bag for mental gymnastics for those who desire such a plaything. At the same time, a rational appreciation of its practical value as an instrument of social adjustment would give unity and harmony along several different lines. Until that time we may expect to find the chaos of sequence of topics a true index of the chaos of subject matter.

GENERAL REVIEWS AND SUMMARIES

SENSATION-GENERAL

BY MADISON BENTLEY

University of Illinois

Upon examining physical standards of measurement (without, unfortunately, referring to the standard physical and psycho-physical treatises upon measurement) De Laguna (5) discovered that the "elementary physical properties and relations form a system of concepts . . . which are evidently incapable of definition in sensational terms." The careful reader will not confuse De Laguna's "sensation" with the sensation of analytical psychology. Cohen (4), too, has difficulties with the term "sensation," which lead him to protest against the fashion of explaining illusory and contradictory perceptions in terms of secondary, "subjective" qualities. Watt (10, 11) continues his noteworthy attempt systematically to formulate the principles of mental integration. Integrated complexes Watt calls "modes," and he contends that "the systematization of the integrative modes of sensory experience is the task that for a scientific psychology inevitably follows upon the systematization of the simplest sensations." Watt's studies should be taken in connection with the Austrian doctrine of *fundierte Inhalte* and *Gestaltqualität*. For the second of these terms Ackerknecht (1) proposes to substitute the term "sensory combination" (*Empfindungsverbindung*) which he prefers also to Witasek's *Vorstellungspräzision*. Ackerknecht thinks that the combinations of figure and rhythm lie at the basis of spatial and temporal perceptions; but he does not make it clear how the addition of a new term is designed to improve our descriptive knowledge of sensory integration. In his critical study of psychological categories, Rahn (9) goes beyond the laws of sensory and non-sensory integration to compare the psychological procedure which analyses, content-wise, into sensations and thought-elements with the view which regards consciousness as act. Rahn is himself inclined toward the categories of activity, wherein is to be found the real *process* of consciousness. Sensations tend, as he thinks, in spite of the protest of

the sensationalists, to be "static entities," while their defenders stumble in the logic of attribute and element. In a long analysis of the concept of sensation, Hofmann (6) criticizes the "pure" and the "simple" sensations, and then he seeks to construct, on the basis of Husserl and Hering, a psychology of visual space. Pikler (8) combats the customary view that sensation bears a definite relation to stimulus and to sensory stimulation. He contends, in a study of comparison, that sensations proceed from an "activity of the subject." Bleuler (3), a veteran student of synesthesia, is convinced that photisms and the like are not ordinary sensations, not images, and not associations; that they are secondary sensations and that they are of the texture of those processes which are indicated by the "dullness" or the "brightness" of tones or the "sharpness" of noises and tastes. In order to discover the grounds for "objectivity" (existence independent of the observer), Berliner (2) presented to her observers dim figures, lines, forms, colors and light-patterns, and later analysed the judgments which issued. The materials of judgment were sensations, sensory after-images, and reproduced images. The writer came to the conclusion that the differentiating factors in the impression which determine objectivity and subjectivity were intensity, quality, duration, localization, and mode of appearance. Martin, Porter and Nice (7) developed a method of faradic stimulation of the body-surface for the determination of the "sensory threshold" (in strictness, a j.n.r; not an RL). Although the method departed at important points from the standard procedure of psychophysics, fairly constant values were obtained. It appears that the pressure of the stimulating electrode was not controlled.

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VISION—GENERAL PHENOMENA

BY EDWIN B. HOLT

Harvard University

Bernstein (3) has presented "a theory of color vision based on phylogenetics" which is mainly another revised form of Hering's theory with some additional comments that are very reminiscent of Mrs. Ladd-Franklin. From the primitive white visual substance there have evolved six visual substances, each with a specific white valence. These substances developed, and now exist, in pairs and yield the six fundamental (antagonistic) sensations red, green-blue; yellow, indigo-blue; yellow-green, violet. But the antagonism of colors depends not on the retina, but on a mutually inhibitory relation between the corresponding (paired) color centres in the brain. Thus normal man has "a three-fold dichromatic system." Hering's assimilation and dissimilation give place here to excitation and inhibition; although "an excitation must be, in fact, always bound up with dissimilation; and inhibition may have the accumulation of energy, that is assimilation, as its consequence." A similar hypothesis of inhibition is made by Fröhlich (9, p. 435).

Troland (29) presents a revision of Hering's general chemical theory of sensory response in which, again, Hering's assumption that stimulation can excite anabolic process, is replaced (for sense departments in which antagonism occurs) by the hypothesis of a chemical interference between paired katabolic processes. Troland states his argument in a mathematical form which, as shown in his paper of 1913 where he discusses the problems of color-vision more in detail, is in harmony with the principles of electro-chemical action; as the Nernst theory of nerve stimulation and a large mass of rapidly accumulating evidence require. He now, from certain "assumptions" which are really admitted facts, derives equations, of a not too cumbersome sort, to describe simple response, "total activity," equilibrium sensitivity, compensatory response, adaptation, recovery, etc. It looks as if certain of these equations, at any

rate, would have to figure in any definitive theory of vision. Lasareff (19) gives equations for the rise of sensitivity during the process of dark-adaptation, and for sensitivity in different stages of light-adaptation. In view of the excellence of this author's aim—to describe visual processes in mathematical form, and in electro-chemical concepts—it is regrettable that he is not experimentally acquainted with, or at least well documented in regard to, the facts to be thus described. His article opens with these words: "The phenomena of twilight vision depend on the simple photo-chemical reaction in the visual purple"; and on this fact he appears mainly to base his formula for the sensitivity of the *light-adapted eye*.

Fröhlich (9), in a long and important contribution, continues his study of the action-currents of the cephalopod eye under light-stimulation. Several of the most general questions relating to sensation are discussed. Fröhlich finds evidence of two adaptation processes, one retinal and one central. Lights of different wavelength produce action-currents of different intensities and frequencies. These travel along the optic nerve to the visual center where, according to their intensity and frequency, they produce antagonistic processes—excitation and inhibition. These latter, of varying strength, are to be regarded as the physiological basis of antagonistic brightness and color perceptions. Contrast is not a retinal phenomenon. The following sentence well sums up what may be called the new programme of physiology of the Verworn-Fröhlich school: "The course of a typical reflex is determined not merely by the anatomical connections of the reflex path, but also by the intensity, the periodicity, and the temporal variations ('zeitlichen Verlauf') of the stimulation waves that start from the sense-organs" (p. 358). Kohlrausch (15) confirms Piper's (Einthoven's and Jolly's) analysis of the retinal action-currents into three components. Two of these components he has produced isolatedly by stimulating the (pigeon's) eye with red and with blue light respectively. By stimulating with purple light he obtained a curve which was almost identical with the algebraic sum of the earlier two. He later (16) obtained similar results with mammalian eyes. Kohlrausch and Brossa (17, 18) report similar experiments on curarized animals (owl, pigeon, etc.) with the eye *in situ*. With the dark-adapted owl's eye practically identical action-currents can be produced by red, yellow-green, blue, and white light-stimuli. With the light-adapted eye of the pigeon, on the other hand, "it

is quite impossible so to adjust the intensities of lights of different wave-length, that their respective action-currents shall be alike: the course of the action-current is absolutely determined by the wave-length of the stimulating light, and the qualitatively different effects of lights of different wave-length on the pigeon's retina, is extraordinarily well-marked in the action-currents." These authors say nothing of periodic frequencies in the action-current; and their work is not immediately comparable with that of Fröhlich. It seems possible that, perhaps owing to different adjustments of the tension in their respective string-galvanometers, they are dealing with partially independent phenomena. Mosso (21) finds, from work on albinos, that the retinal pigment is not the only, and is not even the most important, factor in adaptation.

Ewald Hering, in an introduction to the paper by Dittler and Satake (6), describes his method of determining antagonistic colors. The ordinary procedure, of finding pairs which combine to produce "white," does not yield true antagonists, owing to the *impossibility* of freeing the eye of all trace of color-adaptation. A more reliable way is to get a mixture of two colors which appears white, then to reduce its objective brightness; whereupon the mixture will now assume a tint complementary to any trace of color which may have existed subliminally in the previous "white." The procedure is continued until, when the brightness is lowered, no trace of color becomes visible. This test is said to be sensitive to less than two wave-lengths. Hering calls color-pairs so obtained "antagonistic," as opposed to the 'complementary' pairs found in the usual way. Dittler and Satake give the "antagonistic colors," as determined by this method, for eleven points in the spectrum. A peculiar difficulty of this procedure was found in the fact that it was often impossible so to choose the antagonists that the "white" when reduced should not look *bluish*. Strohal (27) studies in a new way the old question whether complementary colors combine into white (Helmholtz) or cancel each other out and leave a residual white (Hering). He adjusts two colors, say red and blue, so that the just-perceptible white increment is the same for both; to each color he now adds equal amounts of a color, say yellow, which is the antagonist of one of them. His two fields are now red+yellow and blue+yellow. He next ascertains the just-perceptible white increment for each field; and this is found to be always *less* for the field which is a mixture of antagonists, than for that which is made from two non-antagonists. From this Strohal concludes that "in

fact when two antagonistic colors are mixed, a mutual inhibition of the antagonistic chromatic stimulations results, and the gray that is seen is a residue phenomenon." This would substantiate Hering's contention. How this conclusion necessarily follows from the experimental results is not apparent to the reviewer.

Gildemeister (10) is concerned to show that the effects of optical and electrical stimuli are analogous. In general this of course needs no demonstration: but the details are more interesting. Superficially it looks as if light were a continuous stimulus, acting unlike the make and break stimulations of electricity; but strong electric currents stimulate continuously, and faint lights stimulate only at the moments of application and removal. Several other parallelisms between these two forms of stimulus are adduced. The author further finds (11) that the just-perceptible interruption of a light stimulus is briefer as the light so interrupted is brighter. This is in agreement with a familiar fact of flicker, from which, however, "nothing for our purpose is to be derived"(!). But the amount of light subtracted during such a threshold interruption increases slowly with the intensity of the light. A similar law holds of electrical stimulation in nerve and muscle. Ruthenberg (24) confirms this result, and the two authors further agree that for very brief light-stimulation the threshold amount ($\text{intensity} \times \text{time}$) of light is constant through a considerable range; the same for electricity. Ruthenberg shows a summation of subliminal visual stimulation.

Roelofs and Zeeman (23) find no binocular brightness summation *except* for very minimal stimuli (on the reason for this cf. Dawson, reviewed in 1914). Adaptation differences between the two eyes frequently give an apparent binocular summation. "In both light- and dark-adaptation the binocular threshold is lower than the monocular, and in our experiments there is no suggestion of a difference between the light- and the dark-adapted eyes such as Piper has reported" (p. 14). Berger (1, 2) adduces a stereoscopic experiment to show that sensations transmitted by the uncrossed fibres of the optic nerve are incorrectly localized. His error, based on ignorance of the principles of stereoscopic vision, is pointed out by Cords (4). Laurens (20) believes that in respect of the perception of depth and of motion daylight- and twilight-vision are, under some circumstances at any rate, very nearly alike. Groes-Petersen (12) has an interesting paper on the 'contrast-lines' which are visible at the boundary between two brightnesses or at any point where the first derivative of a brightness gradation sud-

denly changes. No explanation is offered; and the phenomena seem to merit further study. A. von Reuss (22) explains a somewhat simple optical illusion visible at the intersection of lines and due to diffusion circles produced by inadequate accommodation. The reviewer believes that this illusion has been explained before. Thompson (28) corrects an observation of Mallock's (1913), who reported that a slight mechanical shock given to the head or body of the observer will cause the motion of an (automobile) wheel to appear momentarily arrested. Thompson finds that if one observes the moving wheel in a mirror, a slight jar of the mirror will produce the same illusion. Mallock's explanation of the phenomenon was inadequate; and so also is Thompson's.

W. F. Ewald (7) presents a long and extremely interesting study demonstrating the presence of simultaneous brightness contrast, successive contrast for both brightness and color, dichromatic central vision, achromatic peripheral vision, etc., in the eye of *Daphnia pulex*. The work of Katz and Révész (13) shows different degrees of pupillomotor reflex for a series of color stimuli in light- and in dark-adaptation (owl). It is concluded that the rods of the owl's eye are adaptable to daylight vision (!): also that the difference between rods and cones in regard to adaptability, as propounded by von Kries' duplex theory of vision, does not hold true. Schultz (25) confirms his previous findings as to the effect of santonin. Small doses of santonin augment violet vision; large doses lessen the same. As violet sensitivity decreases, yellow sensitivity increases (and conversely). Santonin acts on blue- and red-vision as on violet; on green-vision as on yellow. Minimal doses of digitalis (26) increase the eye's sensitivity to green, and reduce the sensitivity to red.

Ferree (8) finds that for its highest efficiency, the eye requires "the field of vision uniformly illuminated and no extremes of surface brightness." Under correct illumination the eye maintains a practically constant efficiency for from three to four hours. The effect of poor systems of lighting "is not so great, however, on the ability of the fresh eye to see clearly as it is on its power to hold its efficiency." Under an intensity that gives "maximal acuity for the momentary judgment the eye runs down rapidly in efficiency." In a system of illumination intensity is of much less importance than uniformity; and most of the lighting systems now in use, for the kind of distribution effects which they give, use too much light for the welfare and comfort of the eye. The author favors the

'indirect' systems of illumination. Kaz (14) believes that such factors as fineness of work, length of working time, etc., are not sufficiently considered in connection with the problem of illumination. He undertakes to state a *Gesetz des Lichtbedarfs*; but the result is singularly vague.

Croskey (5) has published a well-arranged and convenient little treatise on the eye. It is too brief to give anything more than an elementary description of this intricate organ.

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VISION-COLOR DEFECTS

BY SAMUEL P. HAYES

Mt. Holyoke College

Stargardt and Oloff (9) present a very excellent little book for the guidance of officials whose duty it is to examine for color defects. Successive chapters deal briefly but clearly with the importance of color tests, normal color vision, the different types of color defect, and the best methods of testing and diagnosis. Where large numbers are to be tested the authors consider Nagel's cards less satisfactory than Stilling's book, and recommend the employment of spectral tests whenever the type of defect must be determined. Full directions for the use of Nagel's Anomaloscope are printed at the end of the book.

Burch (1) describes a confusion-test which is based upon the same principle as the Stilling test, but allows the substitution of new plates at will. A series of cards, upon which letters have been painted in confusion-colors, is placed in a box and viewed through numerous holes in a zinc screen. By means of a lens the colored letters are put slightly out of focus to obliterate the brush-marks. Helmbold (3) describes a simple apparatus for testing color defectives with equations. Two movable disks 18 cm. in diameter are mounted side by side, with a circle of colored dots 6 mm. in diameter around the edge of each disk. The dots are cut from papers of 58 confusion colors selected by reference to the work of Stilling, Nagel, Holmgren, Daae and the author. Over the disks is placed a shield with 2 holes at the center through which one dot of each disk can be seen at a time. By turning the disks around, any dot may be compared with any other, and the equation recorded by means of minute numbers printed beside the dots, but visible only at very short range.

Edridge-Green (2) reports the results of examining 100 women students with Lord Rayleigh's color-mixing apparatus,—the apparatus for mixing spectral red and green to match yellow, which led to the discovery of that type of color defect which is now called anomalous trichromasy. Edridge-Green reports the discovery of 12 anomalous trichromates, and among those who made a normal equation, 9 were found to be defective in color, when tested in other ways. Edridge-Green asserts that many persons with otherwise normal color-perception make an anomalous Rayleigh equation, while many color-blind persons make a normal equation.

Köllner (4) reports the results of examining 100 men with Nagel's Anomaloscope. While 8 were clearly color-blind or anomalous, 12 more accepted an anomalous equation when allowed to alter the intensity of the yellow.

After comparing the results of many tests of this type, Köllner (5) concludes that color defectives may be arranged in two series: (a) from the normal through those anomalous trichromates who demand an unusual amount of green in the Rayleigh equation, to the typical deuteranopes; and (b) from the normal through those anomalous trichromates who demand an unusual amount of red in the Rayleigh equation, to the typical protanopes with shortened spectrum. Köllner finds no transition forms between the two series.

At the close of the paper Köllner reports experiments upon "a

pronounced case of congenital blue-yellow blindness with red-green weakness like the case of Hering and Vinschgau." A spectral test showed gray zones in the yellow and the blue, but no shortening of the spectrum at the violet end.

In response to Edridge-Green's criticism that "he can find no connection between the luminosity and the color sense of persons having either normal or abnormal color sensation," Watson (11) explains in detail the method of obtaining luminosity curves, and gives 19 plates of curves obtained from individuals having normal and abnormal color vision. In the discussion which followed the reading of this paper, Edridge-Green mentioned that he had made measurements, by a flicker method, of the luminosity for a color-blind observer and stated that these values agreed exactly with those obtained from a normal observer like himself. In the second paper (12) Watson reports the results of testing Edridge-Green and his color-blind subject. The luminosity values of the latter appeared to be quite different from Edridge-Green's and corresponded fairly well with Watson's curves from "green-blind" individuals. In (13) Abney and Watson give the luminosity curves of an observer whom the authors class as an anomalous trichromate. To readers not in sympathy with the Young-Helmholtz theory of three-color mechanisms this work will not seem convincing, especially when it leads to the assumption that in color deficiency one's sensitivity to white light also is reduced (11, page 411).

Among 200 railroad men re-tested with Nagel's Anomaloscope and with the Nagel and Stilling cards, Napp (7) reports the discovery of 2 color-blind and 14 anomalous trichromates. Two subjects make no mistakes in the spectral tests, but are unable to pass the other tests. Napp classes these men as normal. Stilling (10) raises a vehement protest against this and asserts that much confusion has arisen in the discussion of minor color deficiencies because most of the men who have recently studied these cases have been themselves more or less color-blind. Nagel's assumption that anomalous trichromates have heightened sensitivity to contrast is one of the evidences of this confusion; if such were the case, these individuals would most easily decipher pseudo-isochromatic cards. Stilling maintains that with loss of color-sensitivity, the response to simultaneous contrast is reduced or absent; such persons depend upon successive contrast and hence are very slow in making decisions. He believes that most of the so-called anomalous trichromates are cases of moderate color-blindness; those whose red or

green is unequally affected show an anomalous Rayleigh equation. All who cannot pass tests with pseudo-isochromatic cards should be classed as defectives and excluded from railroad and steamship service.

Lohmann (6) reports upon a case of color-blindness due to a 5-hour trip upon a glacier in Switzerland, and describes the results of an experiment to induce temporary color-blindness in one of his own eyes by gazing at a dazzling sheet of white paper.

Usher (8) publishes a pedigree of color-blindness which had been nearly completed by the late Mr. Nettleship. This pedigree includes two women, sisters, whose father and maternal grandfather are both reported color-blind.

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TASTE AND SMELL

BY E. A. McC. GAMBLE

Wellesley College

The only important experimental study of taste or smell which has come to the reviewer's notice in the last year is the work of Parker and Stabler (2). These writers are convinced by observations and experiments of their own and of others that certain fish give evidence of true smell-reactions. The writers adopt the view that in air-inhabiting vertebrates the scent-particles are in solution in the mucus covering the olfactory membrane when they act on the nerve-terminals, the view which (as the writers mention) was first suggested by Johannes Müller, was championed by Aronsohn, and was finally accepted by Nagel, but which has been rejected by both Zwaardemaker and Haycraft. In the opinion of the reviewer, the case for the liquid smell-stimulus is stated in a somewhat one-sided fashion since Parker and Stabler do not meet or mention some of the still significant objections of Zwaardemaker. Be this as it may, the writers, believing that taste and smell alike are liquid-stimulus senses, instituted an interesting series of experiments to bring out the most salient difference between the two senses. They worked upon each other, using as a stimulus (in the crucial portion of their experiments) the purest ethyl alcohol obtainable, a substance chosen because it has a true smell and a true taste and has also, when applied to mucous membrane, a warmish "sting." The purpose of the experiments was to determine the *minimum perceptible* of smell, taste and sting. The diluting medium was distilled water in the taste and tactile experiments and air in the smell tests. For all, the concentrations are expressed in terms of molecular solutions or gas-dilutions. In the work with liquids, about 0.017 c.c. was dropped at each trial upon the tongue near the tip or upon a non-gustatory region of the mouth. The smell experiments were made by the Valentine method; *i. e.*, a drop of dilute alcohol was evaporated in a jar containing a known quantity of air. At each trial, the subject took one inhalation from the jar thus scented and one from a precisely similar jar in which a drop of distilled water had been evaporated. All the proper controls and safeguards appear to have been used. The results are as follows: The weakest stimulus tasted was about a 3 mol. solution; the weakest stimuli which stung the inner surface of the cheek, the area between the lower incisors and

the root of the tongue and the area between the lower incisors and the lower lip were, respectively, 10, 10, and 5 to 10 mol. solutions; the weakest stimulus smelled was a 0.000125 mol. air-dilution. Thus in the case of ethyl alcohol the *minimum perceptible* for smell is only about one twenty-four thousandth of that for taste. The writers, therefore, conclude that the most important difference between taste and smell (as regards stimulation) consists in the vastly greater acuity of smell, although they note as a secondary difference the fact that the sense-organs seem to be adapted to substances of different chemical composition since most odorous substances are tasteless and most sapid substances odorless.

Ponzo (3), makes a painstaking and suggestive comparison of the results of histological and psychological investigation of the sense of taste. His comparison is based in part upon his own study of the human foetus, newborn infant, older baby, older child and adult. Among Ponzo's suggestions are these: The insensitive area on the dorsum of the tongue may have a teleological significance in that it may make the eater get his food more quickly to the back of the tongue where the swallowing reflex is excited. The special sensitiveness of the sides of the tongue to sour tastes may be connected with the proximity of the sublingual and submaxillary glands and the tendency of acid foods to provoke a profuse flow of saliva. Ponzo's paper summarizes most of the data which are available in regard to the topography of taste and most of the speculations which have been based on the facts.

Ellwood Hendrick, a writer who has technical knowledge of chemistry as well as literary skill but who does not show himself at home in physiology or psychology, has made a semi-serious plea (1) for a greater popular interest in the sense of smell, which he justly calls the "Cinderella" of the senses.

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CUTANEOUS AND KINÆSTHETIC SENSES

BY JOHN TRUMBULL METCALF

Princeton University

A study of a skin area which has permanently lost much of its normal cutaneous sensibility is made by v. Frey (7). The author thinks that such a study is a valuable supplement to the work that has been done recently on the cutaneous sensibility of areas supplied by nerves which have been severed and are undergoing regeneration. In these latter experiments the sensitivity conditions are undergoing a continual process of change, while in the area studied by the author the disturbance of sensitivity is a permanent one. The area in question is located on the author's right thigh, and aside from the fact that it came nearly twenty years ago at a time of great physical activity, he can assign no cause to the loss of sensitivity. The area has only about 10 per cent. of the number of sensitive points normal to the region in which it is located, and yet as a whole it is slightly hyperalgesic. The spots react quite normally to their appropriate pressure, temperature, and pain stimuli when these stimuli are of threshold intensity. When, however, the stimuli are more intense, and especially if they are of relatively large area so that they cover more than one spot, it is found that sensitivity is greater than normal. This apparent contradiction the author believes can be explained by the fact that the pain spots in this region react abnormally slowly and there is a tendency for stimuli to summate. The author can find no evidence of a deep-lying sensitivity to pressure like Head's "protopathic." He does find, however, that strong pressure in one place will arouse neighboring pressure spots by the depression of the skin, and this he believes has been misinterpreted as a deeper-lying sensitivity to pressure at the point to which the stimulus is directly applied.

Hacker (10, 11) renders the sensitivity of an area abnormal in various different ways, chiefly by rubbing solutions of drugs upon the skin and by injecting them beneath the epidermis. Stimuli of normal threshold intensity are always used in the investigation of the affected area. The results indicate that pain receptors lie nearest the surface, those for cold come next, and those for warmth and pressure lie deepest. Evidence is found against the disputed paradoxical warm sensation, though the sensation of warmth can be aroused by a mechanical stimulus. The author also finds support

for v. Frey in his contention that there is no deep-lying pressure sense. In another study (12) the same author tries the effect upon cutaneous sensibility of different chemical substances injected into the skin. Acids are found to lessen the receptive power of the nerves, producing a passing anaesthesia. With properly diluted solutions the same effect can be demonstrated with a nerve-muscle preparation from a frog. The author finds evidence that this effect is dependent to a great extent upon the concentration of H-ions. Injection of an alkali results in a slight over-sensitiveness of the skin, but this the author regards as a secondary phenomenon dependent upon the hyperemia induced by the injection. In connection with this factor of hyperemia and the difference in sensitivity that comes with it an article by Pissem斯基 (13) is of interest. Studying the effect of heat and cold upon the blood-vessels of the rabbit's ear, he finds that they react to a change of temperature, distending for a warm stimulus and contracting with cold.

Two histological studies of cutaneous sense organs have been published by Stefanelli (14) and Cohn (5). Both are comparative studies made upon reptiles. An article that should be of value to experimenters in the field of cutaneous sensations is a systematic study, both physical and physiological, of faradic stimuli by Erlanger and Garrey (6).

Abbott (1) investigates the comparative effect of adaptation to different temperatures on the difference limen for given temperatures. The difference limen for a given temperature is found in general to vary with the variation of the preceding adaptation temperature. There is one point in the thermometric scale, however, at which difference sensitivity remains constant regardless of the adaptation. This point is 32.5° C., and this is very close to what has been estimated as normal skin temperature. The author advocates adopting the persistence of normal skin temperature as a more or less constant basis for appreciating variations in temperature. When the skin is adapted to a certain temperature the temperatures between that and normal skin temperature are better judged according as they are nearer normal skin temperature, and those on the other side of normal skin temperature are confused. A theoretical study of the metabolism of sensory response is made by Troland (15). He attempts a tentative revision of the Hering theory, basing his discussion chiefly upon the facts of adaptation in the senses which he finds to be metabolic. The facts of temperature adaptation come in for an important share of consideration.

Alrutz (2) describes two demonstrations of heat sensations, carefully outlining the conditions under which these sensations arise and describing their character. He then summarizes the different facts reported by himself and other investigators which support the theory advanced by him some time ago that heat sensations depend upon a stimulation of the receptors for warmth and cold at the same time. The same author also reports (3) some remarkable phenomena observed under carefully controlled experimental conditions. Making "passes" in the air above the fore-arm of a lightly hypnotized subject causes a loss in it of cutaneous sensibility. Great care was taken throughout to avoid suggestion, and a metal plate was fixed horizontally between the forearm of the subject and the hand of the experimenter. The kind of metal used for this plate made no difference, and the same effect appeared when the plate was of glass. When cotton or wool was used to cover it, however, the effect upon the subject's forearm was markedly decreased. Though the greater number of experiments were made upon one subject, the results were confirmed with others, most of them trained scientists. v. Frey (8, 9) experiments on the strength sense by means of a casing which fits the arm exactly, extending from shoulder to wrist. This casing is a plaster cast covered with leather, and when fitted to the arm it holds it rigid and extended. It is so arranged that when the arm is held horizontally weights of desired size can be hung upon it at two different points, one at the wrist and the other at the elbow. The casing prevents the weights from exerting pressure upon any particular point on the arm so that the weights are not judged in this way, but rather from the amount of strength exerted to raise them. This varies with the distance of the weight from the shoulder, and it is found that when a weight is hung first at the wrist and then at the elbow it is judged as heavier in the former case than in the latter. When the arm with its weight is raised quickly the inertia should become a factor in the judgment in proportion to the angular velocity, and this is found actually to be the case. With this apparatus the author also makes a determination of the difference sensitivity for strength sensations and finds that it is very fine, approaching even the fineness of discrimination for visual intensities. He speaks briefly of the question whether the receptors for the strength sense are in the muscles or the joints, and various considerations lead him to favor the view that they lie in the muscles and tendons.

Bourdon (4) tries to discover the basis of the perception of

movements of the whole body in a straight line. The blind-folded subject is placed upon a table, lying on his back, sitting, or standing, and the table, which is mounted on wheels, is moved in one direction or another, the subject indicating in which direction the movement has been. Experiments are also made in which, by means of a specially constructed apparatus, the subject is fastened tightly to the table. The purpose of this is to eliminate the cutaneous sensations which are otherwise aroused by the shifting of weight due to the body's inertia as the table moves. The results are negative, tending to show that these cutaneous sensations are not the basis of the perception of movement. Nor does the author think that the sensations of movement in a straight line can be referred to the organ for sensations of movement of rotation. They differ from the latter in two ways, first in that they do not persist after the stimulus has been removed, and second in that they are much less delicate.

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ORGANIC SENSATION

BY EDWIN G. BORING

Cornell University

The problem of the organic sensations was definitely stated by Meumann (10), who pointed out that, whereas, on the one hand, the clinical evidence obtained from operations performed with local anesthesia (Lennander's work is representative) and the physiological evidence point to the insensitivity of all the internal organs except the parietal peritoneum, the causal observations of everyday life and the reports of pain in pathological cases indicate, on the other hand, a wide range of internal sensitivity. Meumann urged the latter view on the basis of introspection, and supported it by the teleological argument.

Becher (1) introduced stimuli into the esophagus, stomach, and rectum. The esophagus he found, in general, sensitive; the stomach and intestine, insensitive. The sensations that Meumann referred to the stomach, Becher attributed to the body-wall. The organic nature of the emotive life he explained by the sensitivity of the abdominal wall, the diaphragm, the pleura, the peritoneum, and, probably, the esophagus. The other organs, including the stomach, intestine, lungs, and heart, were held to be insensitive. In more systematic experimental work, Hertz, Cook, and Schlesinger (7) supported Becher as regards the insensibility of stomach and intestine to thermal stimuli, but showed that these organs are sensitive to alcohol and carminatives.

Meantime, Kast and Meltzer (8) had explained Lennander's results by showing that, although dogs operated under a local anesthetic gave every evidence of visceral anesthesia, the omission of the anesthetic led to typical pain reactions when the internal organs were stimulated. Since these reactions ceased when cocaine was injected at any part of the body, they concluded that a general insensitivity was produced by way of the circulatory system. Later (9) they showed that the exposure of a large part of the viscera was followed by a deadening of sensibility; the parietal peritoneum is least affected. These results are supported by Ritter (14), who made similar experiments.

In a second paper (11) Meumann replied to Becher's contention that sensations, apparently stomachic, are mediated by the body-wall. He insisted upon distinct sensations of emptiness, of fullness

and satisfaction, of hunger, and of burning in the stomach and held that the superficial muscular tissue is inadequate to so great a variety of experience. The burning sensations he demonstrated by swallowing large amounts of spices in capsules. He argued also for a specific heart and a specific lung sensation, and agreed with others that the veins are sensitive to pain. Becher, in his reply (2), reverses his former conclusion. The experiments of Hertz, Cook, and Schlesinger, some of which he repeated, led him to admit the sensibility of the stomach to cold, heat, and pain, and of the intestine to pressure, cold, heat, pain, and electrical stimulation. Meumann's final article (12) reviewed the work of Ritter and of Kast and Meltzer, and clinched his plea for the widespread sensitivity of the internal organs.

Hertz's book (6) summarizes to 1911 the work done upon the alimentary canal. His general conclusions are that "the mucous membrane of the alimentary canal . . . is insensitive to tactal stimulation"; that "the mucous membrane of the esophagus and the anal canal is sensitive to thermal stimulation, but that of the stomach and intestines is insensitive." "The sensation of fulness in the alimentary canal is due to a slow increase in the tension exerted on the fibers of its muscular coat." The "immediate cause of true visceral pain is tension; . . . the sensation of pain in the alimentary canal is due to a more rapid or greater increase of tension on the fibers of its muscular coat than that which constitutes the adequate stimulus for the sensation of fulness."

But the debate is not ended, for Mitchell (13), writing in the same year, returns to the hypothesis of Lennander. By a correlation of the reports of patients before operation with his subsequent findings, he concludes that there is a "definite contrast in the sensibility of the parietal and visceral peritoneum in the unopened abdomen in man," and that abdominal pain may in general be ascribed to the former.

Cannon and Washburn (3, 4) have established the concomitance of the sensation of hunger with strong contractions of the stomach, which, they believe, are the cause of the hunger. The hunger contractions were recorded pneumatically by a rubber balloon within the stomach. Carlson (5) was fortunately able to extend these observations upon a subject with a gastric fistula. Stomachic contractions and reports of hunger were recorded, sometimes for several hours. Besides confirming Cannon and Washburn, Carlson showed that "there is a fairly close correspondence between the

strength of the stomach contractions and the degree of hunger sensations experienced simultaneously," that with prolonged fasting a mild contraction is accompanied by unusually intense hunger, that continuous hunger is associated with gastric tetanus, that a single contraction of even the "twenty-seconds rhythm" (the weaker of the two typical stomachic rhythms) may, if fairly strong, give rise to a recognizable hunger pang, and that "the recognition of a stomach contraction as a hunger pang depends not only on the strength of the contraction, but also upon the rapidity of the development of the contraction phase." Mechanical pressure upon the mucosa is not adequate to the hunger sensation; tension of the muscular fibers probably is. No attempt is made to establish a specific sensory quality of hunger, which is said to contain "elements of kinesthetic sensation as well as of pain."

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SYNÆSTHESIA

BY HEBERT SIDNEY LANGFELD

Harvard University

Langenbeck (4) in his article upon chromæsthesia describes his own case. He sees colors both in connection with the vowels and the cardinal numbers. The sound of the words, and not the meaning, immediately produces the colors. This is especially proven from the fact that foreign words may produce colors antagonistic to their meaning. "Rouge" and "noir," for example, are accompanied by black and red respectively. A table prepared to show the colors reported by a number of authors to be connected with the vowels shows the usual divergencies. The difference of location of the colors by different subjects is described, and there is also a discussion concerning terminology. The principal part of the paper is concerned with the several theories as to the origin of the phenomenon. The important facts for and against the physiological, the Darwinian, and the psychological theories have been gathered from the literature. The author considers the psychological theory of chance association to be the most adequate; associations which have occurred in youth and whose origins have been forgotten.

C. S. Myers (6) reports an investigation he has made of the chromæsthesia of the Russian composer Alexander Scriabin. Colors are so important for the musician that he wishes his "Prometheus" to be played to the accompaniment of colored lights and his "Mystery" with both colors and odors. For Scriabin the colors are connected with the tonality of the music. He frequently notices a change of color before he does one of tonality. "Scriabin finds that as he passes from hue to hue, the successive colors correspond to tonalities rising by a series of fifths." This association of consecutive scales with consecutive spectral colors confirms Myers previous assertion "that for the *full* development of synæsthesia, a strong tendency to a certain kind of association is requisite." The second case described by Myers is that of a woman painter. The colors vary with the pitch and the timbre, and are different from those seen by Scriabin. Like the latter this subject is more "alive" to the color components than to the tonal components. They also agree in that "the effect of increasing the richness of a tone by adding to its overtones results in a 'rise' of the color of the tone."

Coriat (2, 3) reported two cases of synesthesia. The one had colored hearing and taste synesthesia. Blue in its various shades was suggested by sounds. Unlike Langenbeck (mentioned above) the synesthesia was limited to English words. Numbers were arranged visually in geometrical forms. Colored gustation was not well developed. Beautiful colors tasted good, and color discords were nauseating. The synesthesia was irreversible and this is one of the facts used by Coriat in support of a physiological explanation. He believes in the "theory of nerve irradiation, arising from a congenital defect of the nervous system." The other case of synesthesia is that of "colored pain." Hollow pain is blue; sore pain, red; deep headache, vivid scarlet; etc.

Langfeld (5) has investigated the chromesthesia of a talented woman musician. Two examinations, seven years apart, were made. The color associations remained practically unaltered. When tones, which corresponded to the complementary colors, were struck together a gray effect was produced. In chords the color of the fundamental predominated. In dissonances the colors were paler. Langfeld believes that the facts support a physiological explanation.

Bleuler (1) has written a long and interesting theoretical discussion of synesthesia. Lack of space prevents details, but the main theme is a defense of the physiological theory as against a theory of accidental association.

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DISCUSSION

MONOCHROMATIC STIMULI OBTAINED BY MEANS OF FILTERS

A recent note by Schulz¹ sets forth certain facts regarding the use of filters in color-experiments. These facts have been long familiar to physicists, but seem to have been largely disregarded by psychologists, although it is probably to the latter that they can be made most useful.

Certain purposes demand the use of stimuli extending over a very narrow range of wave-lengths and giving a high brightness over a large surface. If the source of light used gives a continuous spectrum, a spectrometer system is necessary for obtaining monochromatic bands in all regions of the spectrum. The total flux which can be passed through such a system is very small as compared with that emitted by the source, since the quantity available is limited by the comparatively small sizes in which the optical parts can be made, and is greatly reduced by absorption and reflection in passage through the system. The total area which can be highly illuminated is therefore quite small; in fact, it is usually necessary to require the observer to look directly at the face of the lens or prism, keeping the eye close behind a narrow slit placed in the plane of the spectrum, in order to obtain sufficient illumination on the retina. It should be remembered also that even the narrow portion of the spectrum limited by the optical slit is not strictly monochromatic; for, due to the factor of width of the slit-openings and to multiple reflection in the system, there is mixed with the "monochromatic" band an appreciable quantity of light of all other wave-lengths. This fact is easily demonstrated by passing the selected band through a second spectrometer system. Ordinary spectral saturation is insufficient for some purposes.

If color-filters are used with sources giving a continuous spectrum, it is possible to produce a high illumination on a fairly large surface, but (except in the case of a few filters) the range of wave-lengths sensibly transmitted is quite wide, with considerable in-

¹ SCHULZ, H.: Ueber Gelatine-Farbboxfilter für Quecksilberlampen. *Ber. d. Dtsch. Physik. Gesellschaft*, 1913, 15, 286 ff.

tensity in other regions than the one whose selection is desired. The saturation of the stimuli thus prepared is much less than that of those prepared with a spectrometer system; and for many purposes color-filters with such a source are useless.

If however the light-source gives a discontinuous visible spectrum, made up of a comparatively small number of widely separated bands, this objection to the use of filters does not hold. The visible spectrum of the mercury vapor arc consists chiefly of four bright bands: one in the violet ($\lambda = 405 \mu\mu$ and $407 \mu\mu$); one in the blue ($\lambda = 436 \mu\mu$); one in the green ($\lambda = 546 \mu\mu$) and one in the yellow ($\lambda = 577 \mu\mu$ and $579 \mu\mu$). There are also bands in the red but they are too faint to be used for most purposes. Schulz demonstrates by spectrograms that each of the bright bands can be isolated by using certain gelatine filters, the colored materials of which he does not give.

Some time ago Mr. M. Luckiesh of this laboratory prepared a large series of gelatine filters for other purposes; and recently at the writer's request, he very kindly examined a number of them, to ascertain which ones would give the desired effects with the mercury-vapor arc lamp as a source. Examination with a grating spectroscope showed that none of his filters isolate the violet band ($\lambda = 405 \mu\mu$ and $407 \mu\mu$). The following filters are satisfactory:

For blue: two filters, one of rosazeine and one of patent blue, used in combination, transmit only the blue line ($\lambda = 436 \mu\mu$).

For green: a combination of two filters, one of potassium bichromate and one of neodymium ammonium nitrate, transmits only the green line ($\lambda = 546 \mu\mu$).

For yellow: chrysoidin transmits the yellow band ($\lambda = 577 \mu\mu$ and $579 \mu\mu$) and the red bands. The latter are very faint and hardly objectionable, but can be practically excluded by adding a second filter containing a mixture of naphthol yellow and naphthol green. This gain in monochromaticity is at some cost of brightness in the yellow band, but the latter remains bright enough for most if not for all purposes.

For red, the mercury spectrum is unsatisfactory, but an auxiliary source may be added, such as a tungsten, Nernst or carbon lamp. Copper ruby Jena glass (Schott No. 2745) 6 mm. thick transmits appreciably only red of wave-length greater than $625 \mu\mu$. If the source is a tungsten lamp operated at specific consumption of 1.25 watts per candle the wave-length of maximal luminosity is about

655 $\mu\mu$. Due to the character of energy-distribution among the wave-lengths transmitted the wave-length of the spectral band giving the same hue is somewhat longer. Its exact value depends on the temperature of the source. Since wave-lengths in this region excite other processes than the red but very weakly, the saturation of the red obtained with this filter is fully as high as in red obtained under the best conditions with a spectrometer system. The comparatively wide range of transmission therefore is not objectionable save in work which involves the factor of chromatic aberration in the refractive media of the eye.

I consider these facts important, as the sources are efficient and the filters are readily available. Since monochromatic stimuli of high intensity and saturation are so easily preparable in all parts of the visible spectrum, there seems to be little need of further use of less satisfactory stimuli, such as colored papers and filters which with the given light source transmit a wide range of wave-lengths. It is quite possible that better filters than the ones named above for use with the mercury arc can be found. I mention them mainly because they are already known and available.

H. M. JOHNSON

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WORKS OF GENERAL ELECTRIC COMPANY,
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NOTES AND NEWS

IN connection with the report of the committee on the academic status of psychology, see the February number, it is of interest to note that at the newly opened University of Frankfurt the courses in psychology under the direction of Professor Schumann are listed under the faculty of science along with the courses in the other natural sciences, and that the courses in philosophy under the direction of Professor Cornelius are listed under the faculty of philosophy.

NOTES AND NEWS

THE first numbers of the *Proceedings of the National Academy of Sciences*, which will be devoted to "the prompt publication of brief original papers by members of the Academy and other American investigators" as well as to the proceedings and official reports of the Academy, have been received. The editorial board consists of representatives of the different sciences with Professor E. B. Wilson, of the Massachusetts Institute of Technology, as managing editor.

THE following war news items of interest to psychologists have been taken from various sources: Professor C. S. Myers, of Cambridge University, who has been doing medical work at the front since October, is now occupied at one of the large base hospitals in France. Dr. Conrad Schröder, of Giessen, whose special field of investigation was the psychology of religion, was killed September 5. The deaths of Otto Flügel and of Anton Marty are also announced. Dr. A. Marie, director of the psychiatric laboratory at the École des Hautes Études, was recently wounded in the head by a bullet and subsequently an announcement of his death was made.

THE decision has been reached to hold the twenty-fourth annual meeting of the American Psychological Association at the University of Chicago, December 28, 29, and 30, 1915.

IT is announced that among the summer courses at the Johns Hopkins University there will be graduate courses in a number of departments, including psychology.

A COURSE of lectures on psychoanalysis and abnormal psychology, for physicians and students of abnormal psychology, is announced to be given by Dr. A. A. Brill at the New York University Department of Pedagogics.

THE University of Oregon has recently completed a new psychological laboratory.

DR. T. WESLEY MILLS, formerly professor of physiology in McGill University, who contributed to the literature of comparative psychology, died suddenly on February 14.

THE daily papers announced some time ago that a Professor Claparède, of the University of Geneva, had been compelled to resign on account of disturbances in his classes following his unneutral utterances. This was Hugo Claparède, a professor of law. Edouard Claparède, professor of psychology at the University of Geneva, retains his position, and has just returned to his duties with the Swiss army after a leave of two months.

THE

PSYCHOLOGICAL BULLETIN

GENERAL REVIEWS AND SUMMARIES

THE AUTONOMIC NERVOUS SYSTEM

BY F. W. CARPENTER

Trinity College, Hartford, Conn.

I. GENERAL STRUCTURE AND FUNCTIONS

Langley's term, "autonomic nervous system," has become widely adopted for designating all that portion of the peripheral nervous mechanism not included in the cerebro-spinal system of nerves. The latter supplies the organs of special sense and the voluntary muscles of the body, and through it we deal more or less consciously with the external world. The autonomic system, on the other hand, exercises control of the so-called vegetative processes of the body, and since it performs its functions with a certain independence of the brain, and even, in some cases, of the spinal cord, the name proposed by Langley is not an inappropriate one.

It is manifestly impossible to summarize at all adequately our present knowledge of the autonomic system in the space here available. Moreover, especially in respect to the functional side, the writer, whose training has been morphological rather than physiological, is aware of his own limitations. An attempt will be made merely to indicate a number of the more salient features of the modern conception of the system which enables us to understand it to some extent as a working mechanism. For this purpose it will be convenient to follow Langley's nomenclature, and consider in turn the four components or divisions of the system recognized by him, namely, the sympathetic, the sacral autonomic, the cranial autonomic, and the enteric.

Sympathetic.—Of the various divisions of the autonomic system

that known as the sympathetic proper is the largest and most familiar. The term is, indeed, often extended to cover the entire autonomic system. As here understood, however, it is applicable only to those autonomic fibers which arise from the thoracolumbar regions of the spinal cord together with the neurones which continue the paths of these fibers. The sympathetic is, therefore, the middle segment of the autonomic system, the other divisions arising from those portions of the central nervous axis above and below it.

The arrangement of the neurones comprising the sympathetic is typical for the entire autonomic system. The path of the impulses from the spinal cord to the organs innervated is made up of two sets or orders of neurones, one proximal and the other peripheral. The first neurones have their cell-bodies in the spinal cord, where they are situated, according to most observers, in the lateral region of the gray substance. Their axones pass outward in the ventral roots of the spinal nerves, and reach, via the white rami communicantes, the ganglia of the longitudinal sympathetic trunks (vertebral ganglia). Here some end in synapses (pericellular nets) around the cell-bodies of neurones of the second order, while others pass on to terminate in a similar way in more distant ganglia, such as those found in the solar plexus (prevertebral ganglia). Still others of these proximal axones may extend even farther, and reach the scattered and often poorly defined ganglia embedded in the walls of various thoracic and abdominal viscera (peripheral ganglia). None of these first or proximal neurones are themselves believed to reach the peripheral tissues activated by the sympathetic system. All end somewhere in synapses on peripheral nerve cells; hence the name, preganglionic fibers, applied to their axones by Langley.

The peripheral or postganglionic neurones which continue the nervous pathways have their cell-bodies, as has been indicated, either in the ganglia of the sympathetic trunks or in more distant ganglia. These neurones are multipolar. Their dendrites are for the most part confined to the ganglia in which the related cell-bodies lie, but their axones pass beyond these limits, and are widely distributed to the various tissues and organs under sympathetic control. As the components of sympathetic nerves proper, many of the axones in question run directly to organs of the thoracic and abdominal cavities,—stomach, small and large intestines, lungs, heart, spleen, internal genital organs, thyroid and adrenal glands. Here they terminate on smooth muscle, including that of blood

vessels, and on glands (visceromotor, vasomotor, and secretory fibers). Other postganglionic fibers, on leaving the ganglia of the sympathetic trunks, run in the gray rami communicates to the spinal nerves and accompany the spinal fibers peripherally in the various branches of these nerves. Such sympathetic neurones are in this way distributed to the blood vessels of the trunk and limbs (vasoconstrictor and vasodilator fibers), and to the sweat glands and erector muscles of the hairs in the skin (secretory and pilomotor fibers).

Sympathetic pathways to the iris and to the skin, blood vessels, and glands of the head region are provided by the cervical sympathetic trunks and their cephalic extensions. The preganglionic axones concerned terminate in the superior cervical ganglion. The postganglionic fibers given off from this ganglion pass without interruption to the tissues innervated.

The sympathetic neurones thus far dealt with are all efferent in function. They are accompanied, however, by afferent fibers, the latter appearing to be fibers from spinal ganglia with sympathetic distribution. In other words they are the peripheral processes of neurones, the cell-bodies of which lie in the ganglia of the dorsal roots of the spinal nerves. The central processes of these neurones enter the spinal cord by way of the dorsal nerve roots, but their connections in the central nervous system are not well understood. The peripheral processes terminate in sensory endings in the field of sympathetic distribution. The existence of intrinsic afferent neurones in the sympathetic system—sensory neurones with their cell-bodies in vertebral or prevertebral ganglia—is still a debatable question.

Sacral Autonomic.—Separated from the sympathetic by a considerable interval another set of preganglionic fibers emerges from the cord farther backward, that is, from the sacral region. These fibers, passing outward in the roots of the second, third, and fourth sacral nerves, and relayed peripherally by postganglionic neurones, conduct impulses to the lower portions of the digestive tube, to the bladder and urethra, and to the external genital organs, thus invading a part of the territory covered by the sympathetic. To this segment of the autonomic system the name, sacral autonomic, is applied. The afferent components of the sacral division probably have the same structural relations as those of the sympathetic.

Cranial Autonomic.—Preganglionic fibers belonging to the auto-

nomic system arise from two regions of the brain stem, the midbrain and the medulla. In the cervical portion of the spinal cord no preganglionic fibers are given off in the roots of the spinal nerves. White rami communicantes are wholly lacking. Consequently the sympathetic system, which extends forward centrally only as far as the first thoracic nerves, is separated from the cranial autonomic along the central nervous axis by the entire extent of the cervical cord.

The preganglionic fibers of the midbrain autonomic run in the third cranial or oculomotor nerve to the ciliary ganglion in the orbit, and are relayed thence by postganglionic nerves, the axones of which constitute the short ciliary nerves, and innervate the ciliary muscle and the sphincter of the iris.

The preganglionic fibers from the medulla (bulbar autonomic) pass outward in the seventh, ninth, tenth, and eleventh cranial nerves. Those emerging in the seventh nerve are distributed to and end in the sphenopalatine, submaxillary, and sublingual ganglia of the head. From these relay stations postganglionic neurones continue the nervous pathways, passing from the sphenopalatine ganglion to the tear glands and nasal and buccal mucous membrane, and from the submaxillary and sublingual ganglia to the salivary glands of the same name. The preganglionic fibers of the ninth cranial nerve appear to terminate in the otic ganglion. The second neurones in the course of these fibers are distributed to the parotid salivary gland and elsewhere in the facial region.

A large and important component of the bulbar autonomic is found in the preganglionic neurones leaving the medulla via the tenth and eleventh cranial nerves. A few of these may have their terminal synapses in the jugular ganglion at the base of the tenth nerve; but at least the majority of the fibers course in the vagus to a wide distribution, reaching the digestive organs from oesophagus to the middle region of the colon, the respiratory organs, heart, pancreas, and kidneys, possibly also the liver. These preganglionic fibers of the vagus probably establish connections with the cells of small and loosely aggregated ganglia found in or near the organs supplied. The short postganglionic axones which complete the paths innervate involuntary muscle and glandular tissue (visceromotor and secretory fibers).

With the efferent cranial autonomic neurones described above there are functionally associated afferent neurones comparable to those of the sympathetic system in that their cell-bodies are found

in cranial ganglia homologous with the dorsal root ganglia of the spinal nerves. The ganglia of the trigeminus and the vagus are the ones chiefly concerned in reflexes effected through cranial autonomic fibers.

Enteric.—The plexuses of Auerbach and Meissner (myenteric and submucous plexuses) in the walls of the digestive tube have been provisionally placed by Langley in a division by themselves under the name of the enteric system. This seems to him necessary in view of the uncertainty that exists regarding their relations to the sympathetic and cranial autonomic fibers distributed to the walls of the alimentary canal. It is an interesting fact that when the last mentioned fibers are cut, the usual movements of the digestive tube nevertheless continue, presumably under the influence of the local enteric system, which appears to function as an automatic reflex mechanism independently of the extrinsic fibers. Under normal conditions the latter may exercise a regulatory control only. On the assumption that no purely afferent neurones are present in the enteric system (a matter which is in dispute) motor reflexes taking place here have been explained by supposing that impulses may pass from the enteric epithelium along the axones of neurones usually efferent, and thence via the collaterals of these axones to the muscles concerned (axone-reflex of Langley).

Double Innervation and Antagonistic Action.—It is evident that the distribution of the sacral and cranial autonomic overlaps, in many parts of the body, that of the sympathetic. For this reason it has been proposed by Langley to designate the sacral and cranial autonomic fibers by the name of parasympathetic, since they terminate, broadly speaking, alongside those of the sympathetic system. The heart, for instance, is innervated both by the sympathetic and the cranial autonomic, fibers of the latter reaching it through the vagus. The distribution of the sympathetic is general throughout the length of the digestive tube; but in the region extending from the oesophagus to the middle colon there is an overlapping of vagus fibers, while the descending colon and rectum are supplied in part by sacral autonomic fibers. Not all portions of the body reached by the sympathetic exhibit this double innervation. There seems, for instance, to be no evidence that parasympathetic fibers contribute to the nerve supply of the adrenal glands or internal genital organs.

Physiological experimentation has shown that the action of

impulses transmitted by parasympathetic fibers is often antagonistic to that of impulses transmitted by sympathetic fibers, so that double innervation frequently carries the implication of opposite nervous influences. A well-known example of this is seen in the autonomic control of the heart. Stimulation of the sympathetic fibers leading to it quickens its action, while stimulation of its parasympathetic fibers (from the vagus) causes it to beat more slowly. There is good evidence that the vagus accelerates the peristaltic movements of the stomach and intestine, whereas the sympathetic splanchnic nerves have an inhibitory action.

Pharmacological studies on the action of drugs such as atropin, pilocarpin, adrenalin, etc., have furnished further evidence of the physiological dissimilarity of the sympathetic and parasympathetic nerve endings. A given drug may affect those of one set of autonomic fibers without influencing in any apparent way the endings of the other set.

Normal Stimuli for the Autonomic System.—The efferent autonomic nerve fibers are normally brought into a state of functional activity in a variety of ways.

1. This may be accomplished through the stimulation of sensory endings, somatic or visceral, followed by a reflex, as when warm air in contact with the skin sets up impulses in sensory cerebro-spinal nerves which pass to the central nervous system. These impulses return peripherally along the autonomic fibers to the sweat glands, and the latter respond by increased activity. Cold air in a similar way affects through the pilomotor fibers the erector muscles of the small hairs distributed over the body, and the result is seen in the so-called "goose flesh."

Attention may here be called to the way in which bodily pain influences reflexly the autonomic system. In the presence of severe pain the pupils dilate, the frequency of the heart beat is changed, the tears may flow, and the secretion of saliva may be increased. Pawlow has shown that both the movements and secretion of the stomach are inhibited. The source of the pain—whether in visceral or somatic regions of the body—seems immaterial. Consciousness is not a necessary factor in the reflexes.

2. Nervous activity may also be induced through the agency of internal secretions. A comparatively new field for physiological investigation has been opened by the appreciation of the fact that the products of such "ductless glands" as the thyroid and adrenals have specific effects upon the autonomic nervous mechanism. An

illustration is afforded by the susceptibility of the sympathetic system—but not the parasympathetic—to adrenalin or epinephrin, a constituent of the secretion of the adrenal glands. One effect of a surprisingly small amount of adrenalin in the blood is the sensitizing of the vasoconstrictor nerve endings so that the efferent impulses discharged cause the muscular coats of small arteries to contract vigorously, the result being an increase in blood pressure.

3. An intimate relation exists, furthermore, between certain mental states, especially emotions, and the activity of the autonomic nerves. While, unlike the cerebro-spinal system controlling the voluntary muscles, the autonomic gives little or no evidence of being subject to voluntary control, it responds in a striking manner to "stimuli" afforded by certain mental processes, chiefly those which are of an emotional nature. A variety of instances might be adduced. Thus it is well known that the mere sight of food will in a hungry person or dog cause a lively secretion of the salivary glands through "psychic" stimulation of the parasympathetic. Pawlow has obtained evidence that under such conditions not only do the salivary glands become active, but the gastric glands, through impulses from the vagi, also discharge their secretions. Cannon has determined through the use of Röntgen rays that the digestive movements of the cat's stomach and intestine cease when the animal shows signs of anxiety, rage, or distress. Pawlow has shown, furthermore, that in an angry animal the secretion of gastric juice stops even for hours at a time. It is a common observation that at the sight of an enemy the hair of many animals rises along the back as the result of stimulation of the pilomotor nerves.

If emotions are functions of the cerebrum, then the correlated nervous impulses must pass downward from the hemispheres through the brain stem and spinal cord to reach the autonomic nerves. Only thus can be brought about in distant parts of the body those changes which appear as the physical concomitants of the emotions. Of the exact paths—fiber tracts—followed by such impulses in their course through the central nervous system we know to-day practically nothing. Again, if nervous impulses which arouse in consciousness sensations of pain must reach the cerebral cortex to accomplish this, then afferent paths must connect the cortex with the visceral organs. It is an only too familiar experience that vaguely localized sensations of pain, often severe, result from certain forms of lesion in the viscera. However, the

intra-spinal and intra-cranial portions of these sensory paths are as imperfectly known as the corresponding efferent paths. It should be mentioned that Bechterew, through electrical stimulation of the cerebral cortex, has attempted to locate here centers for vegetative functions, including movements of the intestine, secretion of sweat, etc., but his results lack confirmation. The only autonomic centers in the brain which have been at all definitely made out, such as those for pupillary reflexes, salivary secretion, and vasoconstriction, are found in the brain stem (diencephalon, midbrain, and medulla).

II. RECENT CONTRIBUTIONS TO THE PHYSIOLOGY OF THE AUTONOMIC SYSTEM

"Emotional" Stimulation.—The excitatory influence of emotions on the sympathetic nerves supplying the adrenal glands, and the subsequent widespread effects of the adrenal secretions thus called forth, have been investigated during the last few years by W. B. Cannon and his collaborators. The results of these studies, which have a special claim to the interest of psychologists, are summarized and discussed in two recent papers by Cannon (8) and (9).

A starting point for the investigations in question is found in the artificial stimulation of the splanchnic nerves (sympathetic) which supply the adrenals. This induces secretory activity in the central or medullary portion of the glands. The result is an internal secretion of a specific substance (adrenalin or epinephrin), an increased amount of which can be detected in the blood following the application of the stimulus. To determine whether similar secretory impulses are aroused by natural events in an animal's life, Cannon and de la Paz (11) examined the blood of a cat which had been frightened by a barking dog. They obtained definite evidence of the presence of adrenalin. Blood from the same vein tested just before the excitement gave negative results. Strong stimulation of the sciatic (spinal) nerve of an anæsthetized animal, such as would cause severe pain if the animal were conscious, was found by Cannon and Hoskins (12) to induce a reflex which likewise excited the adrenal medulla to increased activity. The same result was obtained under conditions of asphyxia.

When the splanchnic nerves are stimulated artificially, not only is adrenalin liberated from the adrenal glands but sugar is also released from the liver. This increase in the amount of sugar in

the blood does not follow excitation of the splanchnics after removal of the adrenals from the body, a fact which seems to indicate that the glands play an essential rôle in occasioning the hyperglycæmia. Here, as in the case of adrenalin production alone, experimentation has proved that pure emotional excitement—fear or rage—has the same effect as direct stimulation of the sympathetic nerves. Cannon, Shohl and Wright (15) obtained glycosuria in excitable cats by simply fastening them in comfortable holders under conditions eliminating the possibility of pain, and also by allowing a dog to bark at them while they were confined in small cages. The glycosuria did not appear in excited animals after excision of the adrenals. Cannon (9) states in a footnote: "Mr. C. H. Fiske and I have found sugar in the urine in 12 of 25 members of the Harvard University foot-ball squad immediately after the final and most exciting contest of the season. Five of the positive cases were substitutes who were not called upon to enter the game. The only spectator whose urine was examined had a marked glycosuria."

That the liberation of sugar and adrenalin under conditions of pain and major emotions is of value to the organism as a whole seems clear. Sugar furnishes the muscles with energy; adrenalin causes them to respond more readily to nervous impulses, thus lessening the effect of fatigue. Adrenalin also, through inducing vasoconstriction in the organs of the abdominal cavity—intestines, spleen and kidneys—forces more blood into the muscular regions of the body.

Cannon (9) summarizes as follows his interesting conclusions regarding the value of emotional stimulation of the sympathetic:

"The cessation of activities of the alimentary canal (thus freeing energy for other parts); the shifting of the blood from less insistent abdominal viscera to the organs immediately essential to life itself, such as the lungs, the heart, the central nervous system, and, at critical moments, the skeletal muscles as well; the increased cardiac vigor; the quick abolition of the effects of muscular fatigue, the mobilizing of energy-giving sugar in the circulation—these are the changes which occur when fear or rage or pain causes the adrenal glands to pour forth an excessive secretion. These changes in the body are, each one of them, *directly serviceable in making the organism more efficient in the struggle which fear or rage or pain may involve*, for fear and rage are organic preparations for action, and pain is the most powerful known stimulus to supreme exertion. The organism which with the aid of increased adrenal secretion can best

muster its energies, can best call forth sugar to supply the laboring muscles, can best lessen fatigue, and can best send blood to the parts essential in the run or the fight for life, is most likely to survive. Such, according to the view here propounded, is the function of the adrenal medulla at times of great emergency."

The results of Cannon and Mendenhall (13, 14) are supplementary to the foregoing. They show that stimulation of the splanchnic nerves shortens the coagulation time of the blood, but this is not true if the adrenal gland is removed on the side stimulated. The same effect on coagulation is produced by artificial stimulation of sensory spinal nerves, and especially by emotional excitement. It follows that pain and excitement may be of service to an animal in preventing, through rapid clotting, the loss of blood from wounds received in a struggle.

Metzner (41) discusses the structure and functions of the autonomic system with special reference to the part played by emotions in determining its activity. His reference to a recent experiment by Elliott is of peculiar interest from a psychological point of view by reason of its bearing on the James-Lange theory of emotions. If the drug β -tetrahydronaphthylamine hydrochloride is injected subcutaneously into a normal cat, the animal exhibits, as a result, all the signs of fear and rage. The same injection made in a cat which, by an operation, had had its spinal cord completely severed in the neck region produced a similar result. The cat became excited and enraged, even biting its keeper, although no nervous impulses could pass to the brain from the organs innervated by the sympathetic system.

The Gastric Hunger Mechanism.—A. J. Carlson and his associates have published in the last two years a series of papers on the physiology of the stomach which have contributed to the precision of our knowledge regarding the autonomic mechanisms involved in the sensation of hunger. The chief subject of these studies has been a young man (Mr. V.) with a complete closure of the oesophagus, and an abdominal fistula of the stomach through which he takes food—"a second Alexis St. Martin."

The sensation of hunger according to Carlson (17) is synchronous with strong contractions of the empty stomach, as recently demonstrated by Cannon and Washburn. Contractions of the oesophagus may also be involved (Carlson and Luckhardt, 26). Carlson has been able to arouse hunger sensations in his subject by mechanically produced contractions of the previously quiescent

stomach, and this he regards as "a demonstration of the peripheral genesis of hunger." He (18) finds that the contractions of the empty stomach may be inhibited (1) by stimulation of the gustatory end organs in the mouth, (2) by chewing indifferent substances, (3) by chewing palatable foods when hunger and appetite are present, and (4) by swallowing movements, the latter being, however, only partially effective. By these means the sensations of hunger are abolished to the same degree that the stomach contractions are inhibited. As to the nervous reflexes involved the author's opinion is that "the nerves of taste and at least some of those of general sense in the mouth contribute the afferent path. The actual inhibition is brought about either by a complete reflex through the inhibitory fibers in the splanchnic nerves and the vagi, or else the inhibition of the vagus tonus through action on the lower brain centers is the main factor." Carlson and Lewis (25) add smoking to the list of stimuli which, by a nervous reflex from the mouth, cause a cessation of hunger contractions in the empty stomach. The tightening of a belt around the abdomen, contrary to a popular belief, failed in large measure to produce the inhibitory effect except in the case of weak contractions.

In experiments on dogs Carlson (21) observed that "the sight and smell of food lead to temporary inhibition of the hunger contractions, and the inhibition is directly proportional to the degree of interest taken in the food." He regards this as a true "psychic" reflex. During sleep gastric hunger contractions persist with the same rate and intensity as when the dog is awake. Complete section of the splanchnic nerves increases the gastric tonus and the hunger contractions. Section of the vagi lowers the gastric tonus. When both splanchnics and vagi are cut the movements of the empty stomach continue, although a hypotonic condition exists. From this it seems clear to the author that "all the essential characteristics of the hunger contractions of the empty stomach are determined by the local gastric motor mechanisms." It is recognized that under certain conditions tonus fibers in the vagi may inaugurate or intensify the gastric hunger movements.

In both man and dogs reflexes inhibiting gastric hunger contractions can be obtained by introducing directly into the stomach weak acids and alkalis, alcoholic beverages, and even water (Carlson, 20, 22). The inhibition is primarily a local reflex, as may be proved in dogs by sectioning the extrinsic nerves. The same inhibitory effect on the stomach is obtained by introducing similar

substances into the small intestine (Brunemeier and Carlson, 7); but in this reflex the extrinsic nerves play the principal rôle, although local reflex paths are to some extent involved.

The study of a variety of different influences on the gastric hunger mechanism leads Carlson (23) to the interesting conclusion that ordinary events of life tend to stimulate the inhibitory splanchnic apparatus, thus abolishing hunger. From such sources of stimuli the excitatory vagus apparatus appears to be singularly isolated. He regards this as a biological provision for limiting the positive stimulation of the hunger mechanism to influences developed by the state of nutrition, and to be looked for in the blood. Such stimuli are not afforded by fleeting changes in the nervous system. It is found, for example, that the hunger mechanism is inhibited by extreme muscular activity, such as occurs in running. The same effect follows strong stimulation of the cold and warm nerve endings in the skin. However, as might be expected from common experience, the after effect of prolonged stimulation by cold is a distinct increase in the gastric tonus and the hunger contractions. Intellectual processes and emotional states do not affect the vago-gastric tonus mechanism except so far as they cause inhibition via the splanchnic nerves. Sleep tends to have an opposite effect through the elimination of all inhibitory impulses.

During states of hunger occasioned by contractions of the empty stomach, Carlson (19) observed in his human subject vasomotor disturbances, acceleration of the heart beat, and an increased reflex excitability of the spinal cord, as evidenced by the knee jerk. Carlson and Braafladt (24) report that the normal gastric mucosa is devoid of pain and tactile sensibility, but that a low grade (protopathic) sensibility to extremes of temperature is present. Chemical (and probably mechanical) stimulation gives rise to a sensation identical with appetite. Such excitation of the gastric mucosa increases the reflex excitability of the spinal cord, and induces changes in vasomotor tonus. The latter appears dependent on conscious cerebral processes aroused by the gastric stimulation.

Miscellaneous.—Hoskins and Wheelon (35) criticize the "tonus theory" of adrenal secretion, which supposes that the adrenals constantly pour into the blood a substance that keeps the sympathetic system in a condition of partial contraction. In experiments on dogs they found that the sympathetic system, as evidenced by its continued vasomotor activity, does not suffer primarily from

adrenal extirpation. A study of the innervation of the cat's adrenal glands by the method of degeneration inclines Elliott (32) to the view that preganglionic fibers from the splanchnic nerves extend all the way to the adrenal medulla without the intervention of ganglion cells (postganglionic neurones). He could find no true ganglion cells in the medulla. The preganglionic fibers appeared to end in the nests of chromaffin cells.

Hoskins and Wheelon (36) obtained evidence that the destruction of the parathyroids in dogs is followed by a general increase of irritability in the sympathetic system. According to Rahe, Rogers, Fawcett, and Beebe (44), whatever part hormones may play in calling forth thyroid secretion, experiment shows that the gland responds to stimulation of the sympathetic nerves supplying it by discharging its physiologically active substances into the circulation.

Kuntz (38), after studying the histology of the enteric nervous system, is inclined to believe that the myenteric and submucous plexuses (plexuses of Auerbach and Meissner) contain complete sensory as well as complete motor neurones. According to this view there is present in the wall of the digestive tube a system of intrinsic reflex arcs with anatomically and functionally distinct afferent and efferent elements. Cannon and Burkett (10) found that the nerve cells of the myenteric (Auerbach's) plexus preserve their functional activity for three hours after they have been deprived of their blood supply. When they succumb to the anemia the spontaneous contractions of the alimentary canal cease. This affords further evidence that these contractions are of nervous origin. Carpenter and Conel (27) were unable to secure morphological evidence of a differentiated sensory type of neurone in sympathetic ganglia (vertebral and prevertebral) of the cat and rabbit.

The familiar phenomenon of a quickened heart beat during voluntary exercise is believed by Gasser and Meek (33) to be due chiefly to the decrease in tone of the cardio-inhibitory center which influences the heart muscles through the vagus nerves. The accelerator nerves (sympathetic) appear to play a subsidiary rôle, and are probably called into action as a reinforcement only in times of great need. Their chief function seems to lie in maintaining the level of the resting pulse. It having recently been shown that the vagus nerves contain fibers which have a secretory influence on the kidneys, Pearce (43) undertook experiments on dogs to

determine if the increased secretion might be due to an augmented flow of blood through the renal vessels. His results indicate that this is not the correct explanation, since no evidence of vasodilation was forthcoming. The observations of Asher and Jost (2) are confirmatory. Von Anrep (1) found that the vagus of dogs sends both secretory and inhibitory fibers to the pancreas. Neuman (42) regards the afferent fibers of the abdominal vagus in the rabbit and cat as pressor components, *i. e.*, fibers causing vascular constriction through reflex stimulation of the vasoconstrictor center. The afferent fibers of the splanchnic nerves (sympathetic) are, on the other hand, regarded by Auer and Meltzer (3, 4) as depressor fibers, causing, reflexly, vascular dilation. Bruce (6) adduces evidence to show that under experimental conditions vasodilation may be effected by means of axone-reflexes. Such reflexes are confined to sensory fibers from the skin and their collaterals, and in the author's opinion point to the identity of vasodilator fibers with afferent dorsal root fibers.

According to Cavazzani (28) vasoconstrictor and vasodilator fibers pass from the cervical sympathetic to the blood vessels of the cerebral cortex, where in addition to a vasomotor function they have a certain tonic action concerning which no precise data are as yet available. Edwards (30) describes the anatomy and vasomotor phenomena of the sympathetic nervous system in the turtle. In a later paper (31) he reports experiments on the compensatory distribution of the blood during stimulation of vasomotor fibers in the splanchnic nerve of dogs. Cyriax and Cyriax (29) obtained contraction of the circular muscles at the junction of the descending colon and the rectum by stimulating the coccygeal ganglion of the sympathetic trunks.

The comprehensive summary of Huber (37) dealing with the morphology of the autonomic system brings together a variety of recent observations on its histological structure.

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CEREBELLUM AND BRAIN-STEM¹

BY ROSWELL P. ANGIER

Yale University

Rothmann (13), in extirpation experiments on the cerebellum of the monkey, reports that excision of the cortex of the lobus quadrangularis causes disturbance in the movements of the fore-leg of the same side and that similar disturbances of the corresponding hind-leg appear on cortical excision of the lobus semilunaris superior. Further, if the lateral, median, upper or lower portions, respectively, of either lobe are affected there occur well defined and constant disturbances in leg movement. By simultaneous extirpation of such various portions, either on the same or on opposite sides, different combinations of these defined disturbances may, therefore, be brought about. To such results Rothmann gives the Sherringtonian interpretation—that the cerebellum is the central organ of the proprioceptive system in control of the skeletal muscular reflex tonus and that, consequently, when cerebellar disturbances occur reactions dependent on this system fall out—when, for example, the lateral part of the cerebellar fore-leg center is extirpated, there occurs an absence of the proprioceptive antagonistic reflexes of the adductor muscles, so that the leg may be displaced outwards without being reflexly withdrawn. Rothmann also believes that he has demonstrated that the center for the innervation of the muscles of the larynx is likewise in the cerebellum (lobulus centralis of the lobus anterior). The outlook for extending to the cerebellum and the rest of the nervous system the postulate of that finer localization now become dominant for the cerebral cortex is, according to him, decidedly bright. Brouwer (1) finds that the cerebella of birds show (as Bolk and others had demonstrated for mammals) a certain fundamental type of fissure formation, but he feels that the bird-cerebellum hardly supports the conception of a typical localization of function of the kind maintained by Bolk for mammals. But from the study of bird-cerebella he is much inclined to look on the cerebellum as the regulative organ for the proper coördination of a part of bilaterally functioning muscle-groups. Camis (4) studied the effects of injections of nicotine into the nuclei of the cerebellum. Ocular disturbances predominated when the injections occurred in a lateral lobe and general motor dis-

¹ For the last previous review on this topic see the BULLETIN, 1913, 10, 138-142.

turbances when in the vermis. The broad conclusion is that nicotine acts as a depressor of cerebellar function and not as an excitor—the phenomena being similar to those following excision of the labyrinth. The facts are in line, so the author feels, with his theory that the grey nuclei of the cerebellum represent the center for the cephalic autonomic system, of which the vestibular nerve is one of the most important afferent paths.

Brown (2) noticed, in stimulation experiments on the motor cortex of monkeys, periods of inexcitability accompanied by strong postural flexion of certain muscles of the limbs. Various considerations prompted him to seek the centers for this postural activity in the mid-brain. Stimulation of a point at the cross section of the posterior longitudinal bundle on the exposed surface of the mid-brain of the decerebrate animal at the level of the superior colliculi brought about postural contraction of the flexors of the ipsilateral arm characterized by marked and prolonged after-discharge. Stimulation of the contralateral area evoked similar postural contraction of the extensors, and various typical effects of synchronous compounding of these two phases of stimulation are also described. Furthermore, the action of the *non-postural* contractions (*i. e.*, absence of after-discharge) of flexors evoked by stimulation of the appropriate cortico-spinal tract is antagonistic to the after-discharge in these flexors due to the described mid-brain stimulation. "The non-postural cerebral activity serves to abolish the postural mid-brain activity and thus to leave, perhaps, a virgin field for any subsequent reaction." The paper is too detailed for adequate review; among many significant facts the specific conclusion emerges that it is doubtless the activity of the posterior longitudinal bundle that introduces the postural reactions noticed during the periods of inexcitability in the experiments on cortical stimulation. Forbes and Sherrington (9) report that certain acoustic stimuli evoked reflex movements in the cat from which the brain had been removed, leaving attached to the cord only the cerebellum, the bulb, the posterior and, usually, some part of the anterior, colliculi. Some of the reflexes were such as normally to orient the animal to the stimuli, while others were mimetic responses expressive of anger and aggression. Magnus (10) seeks to determine which parts of the central nervous system must be intact in order that the tonic reflexes, originating in neck and labyrinth, of the bodily musculature (neck and limb movements) may occur. Two groups of such reflexes are distinguished: (1) those released through chang-

ing the position of the head in space—taking their origin, therefore, in the labyrinth; (2) those brought about through changing the position of the head in relation to the trunk, originating in the muscles, etc., of the neck and carried to the central nervous system chiefly through the three uppermost cervical posterior roots. By successive excisions of parts of the brain it was found that the first type of reflexes disappears only when the section of the brain-stem was made just behind the entrance of the eighth nerve—cerebellum and all the rest of the brain having been cut away. All reflexes of the second type remained down to a section $\frac{1}{2}$ mm. anterior to the origin of the second cervical nerve. The respective centers are, therefore, not further anterior than the points of entrance of the afferent paths necessary for the release of the reflexes. The whole medulla may thus go so far as the neck reflexes are concerned. Weed (14), experimenting on fifty cats, locates the center for decerebrate rigidity in the mid-brain and, probably, in the nucleus ruber. Magnus, however, in an appendix to the article just outlined, maintains that all the parts deemed by Weed to be essential may be cut away without abolishing decerebrate rigidity—agreeing, therefore, with Sherrington. Barenne (5), noticing that the decerebrate rigidity of the cat did not lessen when the autonomic nerve supply was severed, concludes that the phenomenon is not simply an accentuation of the autonomic tonic innervation of the muscles, but that the efferent impulses arousing and maintaining the rigidity are those of the anterior root fibers of the cerebro-spinal tracts.

Martin and Gruber (11) attempt to determine the nervous mechanism concerned in the effects of muscular exercise on heart-rate, arterial pressure and changes in respiration. They believe, as the result of several types of experiment, that the immediate effect of muscular exercise on the bulbar centers is due chiefly to associative innervation from the motor cortex, depressing the cardio-inhibitory center, the vasoconstrictor center and the respiratory center, and not to reflexes from the organs of the kinæsthetic senses. Brown (2) refers to a respiratory tract in the mid-brain, determined by evoking gasping movements by faradic stimulation of the monkey's brain on a cross section through the anterior part of the anterior colliculi. The center is very focally localizable about 3 mm. from the aqueduct. Foà (7, 8) brings further evidence to show that the bulbar vaso-motor center may function independently of the respiratory center and that both are automatic,

i. e., dependent on metabolic rather than on sensory stimulation via afferent nerves. The so-called respiratory rhythm of the haemodynamic curve of the dog may persist, for instance, when means are taken to put the respiratory center out of function. Feiling (6), examining bulbar lesions in the brain of a man who had had a fracture of the base of the skull, found degenerations similar to those in dogs that had led to a bulbar localization of a salivary center. The observations suggest, but, in the absence of confirmatory clinical evidence, do not prove, the existence of a similar center in man. Pfeifer (12) offers a review of the technique of physiological investigations of the brain, particularly of its deeper lying parts, without removal of the cerebrum.

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RESPIRATORY, CIRCULATORY AND PSYCHOGALVANIC PHENOMENA¹

BY ARTHUR H. SUTHERLAND

Yale University

A large literature of physiological chemistry now confronts the searcher for information as to automatisms of the above types. Chemical stimuli, electrolytic dissociation products and the chemical analysis of excretory products replace the former discussions of automatisms. The automatisms have become reflexes. Hooker (26), using excised turtle muscle from the arterial and venous walls, finds this muscle more speedily influenced by carbon dioxide than is the case with similar muscle from warm-blooded animals. In small amounts, carbon dioxide relaxes vascular muscle, and if the muscle is in rhythmic movement when stimulated, the rhythmicity is abolished or depressed. Oxygen is essential to rhythmicity and the maintenance of tonus. Douglas and Haldane (10) find that during the hyperpnœa of muscular work there is a very great increase in the volume of the effective dead space; and this increase is due to a dilatation of the bronchi with a consequent diminished resistance to the passage of air. This offers a possible explanation, according to Cook and Pembrey (5), for what is commonly known as "second wind." This may now be thought of as an adjustment of the respiratory and circulatory systems brought about chiefly by carbon dioxide, at the demand of the muscles for an adequate supply of blood. Hasselbalch (22) who claimed to have discovered in H ion concentration of arterial blood the main factor in the regulation of breathing, is vigorously disputed by Higgins (23), who finds that food, posture and other factors influence the tension of carbon dioxide in the alveoli, and that these variations, especially that of change of posture, do not appear to be due to H ion concentration, but apparently to some other agent. In high altitudes, Fitzgerald (14) has compared the alveolar tension with that at sea level, and lays down the following law, which will be of interest to those interested in the relation of conduct to the weather. "The lowering of carbon dioxide pressure is in direct proportion to the diminution of barometric pressure, and amounts to 4.2 mm. or 10.5 per cent. of the sea-level value for each 100 mm. of diminution of barometric pressure." An interesting sex difference occurs

¹ For the last previous review on this topic see the BULLETIN, 1913, 10, 142-146.

in respect to this alveolar pressure. Both in high altitudes and at sea level, the pressure for woman is approximately 3 mm. lower than that for man. And for every 100 mm. fall of atmospheric pressure, the percentage of haemoglobin is increased about 10 per cent. for men. For women the values are about 11 per cent. lower than for men, but greater irregularity is observed. How Hasselbach's chemical explanation would apply to the results of Meyer (37) it is difficult to see. Meyer produced pain by a clamp on the fingernail of the little finger and obtained a hyperpnoea. Carbon dioxide expulsion is diminished and the respiratory quotient increased. Ether also produces hyperpnoea in one minute when applied in low concentration; in high concentration, the breathing is diminished. Individuals were found to differ however. On the other hand, apnea is produced in the duck by submersion in water, or by drawing the head into that position which would be assumed in diving. Breathing continues when the vertex of the head is upward; it ceases when the vertex faces downward. Huxley (27, 28, 29) concludes that the duck resists asphyxia, partly by this reflex cessation in breathing, and partly by a consequent reflex retardation of heart action by means of which less oxygen is demanded. Paton (38) shows that this respiratory rhythm is capable of variations, and that ducks show individual differences which may be grouped into three types, (1) those easily elicited by posture; (2) those in which the labyrinths are the effective mechanism; (3) those in which the cervical relations are more important. Blumenfeldt and Putzig (3) agree with Foà (15) in believing that the frequency changes correlate with a primary autochthonous activity of the inhibitory center, which is secondarily regulated through peripheral stimuli; while Christiansen and Haldane (4) find that true apnea is a chemical apnoea and conclude "there is now left no evidence, so far as the authors know, in support of the vagus theory of inhibition of respiration." The pathway of the reflex is discussed by Barry (2) who finds that inspiratory impulses pass to the medulla by way of somatic nerves to the cord. Visceral impulses may be present and pass upward via the stellate ganglion. Afferent impressions of visceral origin conveyed by the vagus are chiefly inhibitory.

Methodological studies with the galvanometer continue and among these Erlanger and Garrey (12) review the literature both physical and physiological with particular reference to applications in the laboratory. Einthoven (11), Samojloff (46) and

Cybulski (6) in mutual admiration attribute differences of results to differences of methodology; and Galler (16) has devised a method of measuring the simultaneous effects of direct versus indirect stimulations which make possible a measurement of polarization during stimulation. Gildermeister (19) however criticizes this work. The clinical possibilities of the use of the galvanometer are discussed by Kraus, Nicolai and Meyer (31), while Martin, Porter and Nice (34) show the differences which result from various electrodes and compare the results from muscle, nerve and skin of lower animals with the results from the skin of man. Grabfeld and Martin (20) demonstrate that the sensory threshold for faradic stimulation shows a diurnal rhythm which reaches a point of highest irritability at 10 to 11 A.M., declines to 4:30 P.M., then rises. Martin, Bigelow and Wilbur (33) show that during the night there are two peaks of low irritability, one occurring about midnight, the other about four hours later, and suggest that these variations may correspond to variations in the depth of sleep, and may be expressions of a deep-seated rhythm of the nervous system more or less independent of the waking and sleeping state. Martin, Withington and Putnam (35) show that from Monday to Saturday there is an almost continuous fall in irritability, when the subjects pursued the same routine for several weeks. This is interpreted as a result of general fatigue. The curve rises to its high point on Monday morning. But while Grabfeld and Martin (20) show that the diurnal rhythm for faradic stimulation corresponds in general to that for reaction times and the ergographic results and suggest its practicability for studies of abnormal individuals, Dittler and Günther (9) find no curve typical for any particular variety of mental and nervous disease. Pieron (45) finds evidence which he believes differentiates two types of galvanic phenomena; one of muscular origin, an electromotive force; and the other a lowering of cutaneous resistance under the influence of emotions, which facts suggest again the differences pointed out by Martin, Porter and Nice (34)—that with needle or wire electrodes the cutaneous receptors may be affected, while with liquid electrodes the receptors to respond may be those of deep sensibility.

Concerning circulatory phenomena, Martin and Lacey (36) find that a stimulus sufficient to produce a spinal reflex of skeletal muscle is accompanied by a reflex drop in blood pressure, and suggest that even when fear, anger, and other emotional states of a pressor inciting character are not aroused, this fall in blood pres-

sure is due to a reflex peripheral vasodilation. Stewart (47) reports that when the temperature of the environment of the heart is raised, a stimulus previously sufficient to inhibit the rhythmic pulse no longer has that effect. Hasegawa (21), working with excised frog's heart, was able to secure normal rhythmic pulsations with a combination of blood serum, NaCl 0.6 per cent. + CaCl 0.026 per cent. + KCl 0.03 per cent., but Peterson and Gasser (38) believe that metabolic products formed in active muscles play no part in the increase of heart rate resulting from muscular activity, insofar as this action is upon the heart muscle directly or upon the cardiac endings of extrinsic nerves. Gesell correlates (18) excretion of urine chlorides, urea and nitrogen with arterial pulse, and Hill, McQueen and Ingram (24) show that the pulse wave is assisted to the periphery of the body by elastic resonance of the tissue. The vigor of the circulation depends on the tone of the tissues, the tautness of skin and muscles and, particularly, of the abdominal wall. Hill, McQueen and Flack (25) compare the difference of readings of the manometer on arm and leg, the obliteration of pulse being taken as a measure of the systolic pressure. They find the radial reading is a satisfactory indication of blood pressure, and that lower pressure in the leg is due to the larger lumen, greater resonance of tissues and lability of walls of its bloodvessels. Moutier (48) also briefly emphasizes the relation of peripheral blood pressure to tension of the abdominal wall.

Kent (30) offers a most interesting contribution to a possible explanation of the continuity of cardiac automatism in the discovery that the bundles of connective tissue between auricles and ventricles, if followed up, are found to be directly connected with muscle tissue and with the nervous structures of the auriculo-ventricular groove. They have many points in common with the neuromuscular spindles of skeletal muscle, and the function suggested is that of coördination of heart chambers.

Several mere abstracts of investigations on certain ocular-cardiac and respiratory reflexes, aroused by pressure on the eye-ball, hardly call for detailed comment, since no data that would warrant the conclusions are given (1, 7, 8, 13, 17, 32, 40 to 44).

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THE NEURONE¹

BY H. B. FERRIS

Yale University School of Medicine

The work of the past two years on the morphology of the neurone has been largely devoted to the determination of the identity of the various morphological entities hitherto described in the cell-body (*perikaryoplasm*) and the relationship existing between them. A new method of studying the nerve cell, known as vital staining, has also been devised. It will be convenient to consider in turn, the bearing of the literature on our knowledge of the four described morphological differentiations of the neuronal perikaryoplasm, viz., Nissl's granules, neurofibrils, the canalicular apparatus (Binnennetz) and mitochondria.

1. *Nissl's Granules*.—Van Herwerden (16) has shown that under the influence of nuclease from the spleen of cattle, these granules lose their staining quality while other basophilic cell-granules are not affected. He draws the conclusion therefore, that Nissl's granules are not made of albumases, but of a nucleic acid combination. Marinesco (10) has studied the fresh nerve cell in the serum of the animal from which it comes, by means of the ultramicroscope. He finds in the cytoplasm of cells from the peripheral ganglia and the central nervous system of mammals, birds and amphibians a varying number of colloidal granules, of varying size and density depending upon the animal and the size of the cell. These granules have a form similar to that of Nissl's bodies; they are found also in the dendrites, but not in the axis cylinders. Marinesco believes that these are Nissl's granules and that this proves that these granules are not precipitation products but exist in the living cell. Held (5) studied nerve cells by "vital fixation." He decapitated dogs and immediately removed pieces of the spinal cord and made

¹ For last previous review of this topic, consult the BULLETIN, 1913, **10**, 153-163.

smears on glass slides. In twenty-five seconds these were fixed in alcohol kept at a temperature below 0° C., as sudden freezing is believed to prevent cytological changes by alcohol. In the frozen sections Held was able to make out both Nissl's granules and neurofibrils, in a somewhat modified condition however, due to the freezing. The network-like appearance of the granules he believed corresponds to the "glia network" described by Möllgaard. Held considers that this experiment proves the existence of Nissl's granules and neurofibrils in the living nerve cell. Malone (8) claims that Nissl's bodies are characteristically different in the various neurones, so that it is possible to differentiate a motor from a sensory and even a somatic efferent from a splanchnic efferent. If this claim of Malone prove to be true, it will be an important aid in determining the still uncertain functions of the various cell groups.

2. *Neurofibrils*.—Von Szüto (15) takes the position that the neurofibrils are a supporting mechanism rather than a conducting one. He bases this conclusion on the fact that he finds the arrangement of the neurofibrils varied according to the form of the cell and that they therefore form a supporting framework. His paper is not at all convincing. As stated above, Held by means of "vital fixation" and Marinesco as a result of his study of the fresh nerve cell in serum by the ultramicroscope, conclude that the neurofibrils are not precipitations due to the fixing agents, but represent real entities of the living cells. Cowdry (3) has recently studied the development of the neurofibrils in the nerve cells of the chick. He finds that their formation begins in the fifteen somite stage, corresponding to forty hours of incubation. Their formation however, does not begin simultaneously in all parts of the nervous system, but they appear earliest in the hind-brain in the region of the otic invagination, in the mid-brain and the nuclei and root fibers of the cranial nerves, and not till later in the fore-brain. It is not till much later that their differentiation occurs in the spinal ganglion cells.

The functional significance of this variation in the time of neurofibrillar differentiation is not clear. While the neurofibrils are most numerous in neuroblasts, they are also found in apolar and bipolar cells. The first differentiation begins in the region of the nucleus in the form of a network, whether by extrusion of nuclear material, or only under the influence of the nucleus, is not known. It is still the general belief that the neurofibrils from the conducting mechanism.

3. *The Canicular Apparatus.*—It has been proved by the observations of many investigators that this apparatus is not, like the neurofibrils and Nissl's granules, peculiar to the neurone, but is found in many different cells of the body, not only of vertebrates but of invertebrates as well. According to Cowdry (3) the canicular apparatus has been demonstrated in the embryo chick as early as the forty-fourth hour of incubation, and is found at first only at one pole of the nucleus, later extending around the nucleus. Regressive changes and fragmentation of this apparatus have been described in certain toxic and pathologic conditions. Also the division of this apparatus during mitosis of non-nervous cells and its distribution to the daughter cells has been described. While there is still some difference of opinion as to the identity of this apparatus and the Golgi net, the predominating opinion is that they are the same. Recent investigations have thrown no further light on the possible functions of this canicular system.

4. *Mitochondria.*—Mitochondria are not confined to nerve cells, but are found, like the canicular apparatus, in cells in general. Busacca (2) describes the mitochondria in adult reptilian nerve cells as entirely separate from both Nissl's bodies and neurofibrils and independent of them, but concentrated around the nucleus or in scattered groups through the cytoplasm. They are found in both dendrites and axones. Bialkowska and Kulikowska (1) have demonstrated that the same is true in the nerve cells of insects. Luna (7) has found mitochondria in the nerve cells of adult amphibians as well as mammals. Cowdry (3) has tried to solve the question as to whether any genetic relationship exists between the mitochondria and neurofibrils, as is believed by Meves, Duesberg, Hoven and others. His observations included not only a study of fixed and stained tissue, but also of the living nerve cells of the chick, with and without vital stains. He finds that mitochondria exist very early in the nerve cells of the chick, before any somites are formed. They appear as more rounded granules in spheroidal cells and longer and straighter filaments in elongated cells and never form a network. He denies that the neurofibrils are derived from the mitochondria for the following reasons: (1) no changes occur in the mitochondria coincident with the development of the neurofibrils; (2) no decrease is seen in the mitochondria as the neurofibrils increase; (3) no morphological transitions exist between the mitochondria and the neurofibrils. He concludes that mitochondria may be regarded as a more generalized element of the cell having a

less specific function than the neurofibrils. What this function may be is not known.

Vital Staining of the Neurone.—There are a number of investigators working with vital stains in an attempt to determine the morphological differentiations existing in the living nerve cell. Rachmanow (13) has studied the effect of isamin blue and trypan blue on the central nervous system. The dilute stain is given by hypodermatic, intraperitoneal or intravenous injection. He finds that while certain cells of mesodermal origin stain, the neurones and glia cells do not, with the exception of certain cells of the tuber cinereum and the hypophysis. After traumatic injury of the central nervous system however, some of the injured neurones may stain. This latter fact has also been confirmed by MacCurdy and Evans (9). Doinikow (4), studying the effect of vital stains on the peripheral nervous system, found that while cells of the connective tissue coats of a nerve stained, the cells of Schwann stain only slightly at one or more poles of the nucleus. Although the living neurones of the central nervous system do not stain with vital dyes, those of the peripheral ganglia do, showing fine granules which are probably mitochondria. The introduction of these methods of vital staining opens many new fields for investigation and holds out new hopes for the future, but up to the present time they have added but little to our knowledge of the neurone.

Little attention has been given to the question of interneuronal relationship. Monti (11), however, has studied this matter in insects and claims that there the neurone is not a discrete entity, but that an anastomosis of the processes exists and that the neurofibrils pass from one cell to another—that, therefore, the nerve cells in insects constitute a true syncytium. This finding does not, however, negative the neurone theory provided each neurone is developed from a single neuroblast, which so far as is known is true in insects. Still further evidence in favor of the outgrowth theory is furnished by the work of Ingebrigtsen (6), who observed that axones grew out of pieces of the cerebella of young cats and guinea-pigs when grown in plasma, but contrary to the observations of some investigators no anastomoses were seen. The axones grew out into the plasma entirely isolated and without support. This would seem to nullify the doctrine of stereotropism as stated by Harrison, so far at least as the outgrowth of the axone is concerned. Müller (12), studying nerve development in Selachians, also concludes that the axones are outgrowths, from the fact that the peripheral ends of the developing axones are free and not at

first connected with the myotomes, but secondarily make such connection. Zander (17) calls attention to the fact that nerve fibres are found crossing the median line of the body where a fissure existed in the embryo which was obliterated later by the fusion of the adjacent walls, as for example, the median line of the ventral abdominal wall. This he interprets as indicating that the fibres must have grown across, a fact in favor of the outgrowth theory.

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NOTES AND NEWS

THE present number of the BULLETIN, dealing with physiological psychology, has been prepared under the editorial direction of Professor R. P. Angier, of Yale University.

AT Wellesley College Miss Ivy Campbell has been promoted to the grade of instructor in psychology.

AMONG the professors who, in protest against the arbitrary removal of a number of members of the faculty, have resigned their positions in the University of Utah is Dr. Joseph Peterson, professor of psychology.

PROFESSOR W. V. BINGHAM has accepted the professorship of psychology in the Carnegie Institute of Technology at Pittsburgh. A new departure will be the establishment of a bureau of mental tests, for research and for co-operation with the authorities in charge of admissions, with the employment bureau, and with the department of student health. Professor Bingham will remain at Dartmouth College during the summer as director of the summer session.

AT a general meeting of the New York Academy of Sciences, on March 22, Professor Raymond Dodge lectured on "Incidence of the Effect of Moderate Doses of Alcohol on the Nervous System." The lecture was followed by a reception at the American Museum of Natural History.

THE Illinois State Civil Service Commission announce an examination for the position of psychologist at the Lincoln State School and Colony at a salary of \$100 to \$150 a month with maintenance. The examination is open to men and women over 25, and to non-residents of Illinois. Full information regarding the place and scope of the examination may be obtained on application to the Commission, at Springfield, Ill., on or before April 22.

At the seventh annual meeting of the Minnesota Psychological Conference, which was held at the University of Minnesota on April 2, the following papers were read: Tests of Reading, B. F. Pittenger; Tests of Writing, F. L. Whitney; Tests of Arithmetic, A. Gullette; The Psychology of Expression, J. S. Gaylord; Monocular Depth Perception, R. C. Lodge; Mental Tests and Their Relation to School Standards, E. R. Collins; Measurement of School Work, J. L. Stockton.

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THE PSYCHOLOGICAL BULLETIN

GENERAL REVIEWS AND SUMMARIES HEARING

BY ROBERT MORRIS OGDEN

University of Kansas

Von Liebermann and Révész (6) appear to have demonstrated the possibility of a tonal mixture analogous to color mixture in the pathological case of v. L. His chronic paracusis occasions the hearing of a tone of constant vibration frequency differently in his two ears. The resultant impression is a mean tone which corresponds to the arithmetic average of the two apparent tones. To determine the mean tone objectively it was compared with a lower tone lying within the range of v.L.'s normal hearing. In this way the corresponding vibration frequencies of the right and left ear tones, and of the mean or mixed tone, were determined. The mixed tone always appeared between the right and left ear tones, and could be varied at will between these limits by a corresponding variation in intensity of the stimulus as conducted to the two ears. For normal hearing the phenomenon is apparent only as an increase in intensity when a single tone is conducted to both ears rather than to one. For tones of different pitch separately conducted this is not the case. The authors are led to assume corresponding points for like tones in the two ears, similar to the corresponding points of the retinæ. This indicates, presumably, conduction from such corresponding points to a single brain region.

Watt (23) subjects the recent work of Jaensch, Köhler, Révész and others¹ to a careful analysis, and attempts to bring their results into accord with his own theory of the attributes of sound as

¹ Cf. Hearing, the BULLETIN, 1914, 96-105.

set forth in a previous article.² "Pitch" he regards as an attribute of *order*. It is essentially what Révész calls "quality," though not confined to the limits of an octave as Révész proposes. What Révész calls "Höhe" is for Watt "volume." "We have then to suppose that the ear provides us with a single series of orders; pitch is judged by the most prominent order; interval by the 'form' constituted by the prominent orders; volume by the line or mass of orders stimulated at all; pitches and intervals can therefore be compared and fixed to some extent by means of volumes alone." Neither pitch nor volume as such are spatial. "They are simply systemic, *i. e.*, such orders and such continuousness as will with sufficient variation of order constitute a sensory system." Jaensch's results regarding the transition from tone through vowel to noise are accepted, but no reason is found for the assumption of a specific noise sense, older in the race than the sense of tone. Variation in definiteness of pitch, due to increase in number of different vibration frequencies is held to induce this change in the sound. As for the definite location of vowels in the pitch series, it is suggested "that the mouth for some reason or other chooses to form such a cavity for some one vowel that it gives a certain average tone, and that the other vowel sounds are chosen, owing to the otherwise and already existing octave relationship, in relation to this primary vowel."

The author proceeds to sketch a theory of hearing on the principle of stimulations which excite regions rather than isolated fibers of the basilar membrane. It is argued that primitive hearing is sensible only to high tones produced from the region at the base of the cochlea. The point of maximal stimulation in the portion of the membrane which is excited is responsible for the pitch of a sound. This is clearly defined only in the case of simple pendular-formed stimuli, or such complexes as involve simple relations between the regions stimulated. Thus the octave relationship is derived from coincidence of volume. The extent of the membrane aroused by a higher tone always coincides with a portion of the extent aroused by a lower tone, and in the case of the octave the extent of the latter will be just twice that of the former. Low tones are prominent in chords because the maximum of the lowest tone always extends beyond the maxima of the higher tones present. Tones, therefore, correspond to regular systems of sound; noises

² Cf. "The Elements of Experience and their Integration: or Modalism," *Brit. J. of Psychol.*, 1911, 4, 127-204.

to irregular systems. The pitch of noise is thus obscured. Distance is a primitive mode; interval a more refined musical mode. Simultaneous and successive intervals differ in that pitches only can be analyzed in simultaneous intervals, whereas in successive intervals pitch, intensity, and volume all stand out clearly. For this reason, as von Maltzew has pointed out, descending and ascending intervals of the same notes are not apprehended alike.

Meyer (8) referring to Révész's distinction of "pitch" and "quality," calls attention to his own differentiation of attributes made public in 1898, and remarks that the suggestion came to him from Stumpf, who quoted still earlier psychologists. The question of priority is thus inconsiderable, yet the importance of an unambiguous terminology is very great. Meyer had previously used the terms "quality" and "pitch" in direct opposition to Révész's usage. It is now proposed, in the interest of uniformity, that "vocality" be used for the attribute of mellowness and shrillness, height or volume, while "tonality" be adopted to express the qualitative pitch distinction of Révész.

Valentine (19) reports investigations on the appreciation of musical intervals. His subjects numbered 146 adults and 271 children. The intervals were played upon a piano and the judgments recorded immediately after the intervals had been sounded. The order of pleasingness indicated by the average of adult reports was as follows: major third, minor third, octave, major sixth, minor sixth, fourth, tritone, fifth, major second, minor seventh, major seventh and minor second. The last four were judged displeasing. One hundred and ninety-five school children between the ages of six and fourteen indicated no special preferences before the age of nine. At twelve and thirteen, however, their average order was remarkably like that of the adults. There was no appreciable difference in the preferences of the more and less intelligent, nor any correlation found between general ability and certain simple tests of musical capacity. Seventy-six girls of a preparatory school where music was a part of the curriculum showed aversion to discords at the ages of seven and eight, and at nine the order of preference was similar to that of the adults. Two interesting by-products of this investigation may be noted, although under the conditions of experimentation employed the results can hardly be regarded as established. It appeared that nine out of twelve adults, specially tested, found the higher note of an interval to determine its pitch rather than the lower note, as is usually assumed to be the case.

The second result was the detection of more frequent judgments of "sad" and "plaintive" attaching to the major third and sixth than to the minor third and sixth.

In a subsequent investigation (20) Valentine contrasted the results of comparing pairs of intervals with judgments of single intervals. The piano was again used with five musical observers. The method of comparison gave different results from that with single intervals. The general æsthetic value of judgments by the method of comparison seemed less. In the course of the experiments three of the observers showed a striking change in their appreciation of discords, these tending to become more pleasing. The change sometimes occurred after a few seconds. The author suggests a kind of adaptation to discords comparable, perhaps, to what takes place in the development of music. This lends support to the theory suggested by C. S. Myers³ that the perception of consonance and dissonance is dependent, partly at least, upon frequent association. Moore (10) defends this thesis as to the genesis of consonance. His experiments dealt chiefly with the fifth, major third, major and minor seventh produced on a reed organ of tempered intonation. After periods of adaptation to the sevenths, through prolongation and repetition of such an interval, his nine observers indicated marked differences in their judgments of consonance when comparing the four intervals. The major third was found to lose rapidly, while the minor seventh gained rapidly in consonance. The major seventh also gained, though less rapidly, while the fifth maintained a constant level. It is concluded that the greatest pleasure in intervals is attained with a bare consonance. With greater degrees of consonance an affective decline is noted, but this is followed by a certain rise when the stable unitary effects of the fifth and octave are reached. The minor seventh is regarded as nearest the consonant region, while the major third, after adaptation, is found to have passed its zenith of interest. The fifth retains its relative consonance because of its greater stability. Marage (7) contributes also to our knowledge of the effects of habituation. In comparing musical pieces of the 16th and 17th centuries when performed successively upon the piano and upon instruments of the epoch, clavecin, clavichord, lute and viol, his numerous observers reported at first that the metallic tones of the clavecin

³ Cf. *Text-Book of Experimental Psychology*, 2d ed., p. 55. An earlier reference and more complete statement is found in *Brit. J. of Psychol.*, 1905, 1, 315-316. An independent sketch for such a theory is given by Ogden, the *BULLETIN*, 1909, 6, 297-303.

were disagreeable, but speedily they became endurable and finally were regarded as "possédant certains qualités." The ear was found to accommodate itself very quickly. After the first séance the pianist complained that his instrument must have been changed, since, in comparison with the primitive instruments, it no longer seemed to give harmonious effects.

Myers (11), to some extent in collaboration with Valentine, has given a detailed analysis of the introspections of twenty-nine subjects of the two sexes relative to their attitudes towards single tones, bichords and pairs of bichords. The tones were produced by ten tuning forks varying in vibration from 400 to 1,300 per second. In line with the analyses of Bullough on color⁴ the author distinguishes four aspects of attitude: (1) Intra-subjective (cognitive, physiological, emotional, and conative). (2) Objective (appreciation of the sound as having a meaning or use, and as in relation to the subject's standard of purity). (3) Character (anthropomorphic suggestions). (4) Associative (with instruments, music, or surroundings, and symbolic suggestions). Among the results indicated it may be noted that the objective aspect appears to increase with judgments of preference, and to be responsible for instances of indifferent appreciation and impossibility of making comparison.

In a volume of studies from the University of Iowa, the editor has assembled nine papers, eight of which fall within our field. The first paper (15) is Seashore's description of his tonoscope in its improved form. The instrument affords a means of reading directly the pitch of a tone sung, spoken or played. An outline of the various types of problem which it is adapted to solve is also given. Miles (9), using the instrument with 213 observers, men and women, has tested the accuracy of the human voice in simple pitch singing. The voice is found to be about equally accurate in terms of vibrations at all points within its range, therefore, the high tones are sung relatively more exactly than the low tones. A strong standard tone was reproduced as decidedly lower than a weak standard tone. The voice could most easily reproduce the pitch of tones rich in timbre. Vowel quality in a tone was found to affect accuracy of pitch, the *i* being reproduced highest, the *o* lowest and the *a* between. Men and women sang with equal accuracy within their ranges. With women the general tendency was to sing sharp. The average error was 1.5 v.d. for men at the range of 128 v.d., and the same for women at the range of 256 v.d. The average

⁴ Cf. *Brit. J. of Psychol.*, 1908, 2, 406-463.

minimal producible change of voice for men, at the above mentioned range, was 5.5 v.d., and for women, at the octave higher, 3.5 v.d.

Smith's investigation (16) indicates that training in pitch discrimination is very rapid. The approximate physiological threshold was reached at a sitting of less than an hour in more than half the cases of adults and children bright enough to understand the test. The physiological limit was always below the conventional threshold (75 per cent. of right cases), the latter being indicated as 1 v.d. and the former as .25 v.d. Vance (21), repeating some unpublished experiments of Misao Imai, done in the Iowa laboratory, finds the limit of tonality lowered to 13 and 12 v.d. with forks carrying disks of 10 cm. diameter to increase the area of vibration. With a selected group of fifty observers Vance (22) has also tested variations in pitch discrimination at different levels between 64 and 2,048 v.d. The keenest discrimination was found at 128 and 256 v.d. There was slight evidence of tonal gaps, the grosser irregularities disappearing with more extended observations. The women made more accurate judgments when the second tone was higher, and surpassed the men at every level, the variation being greatest at the extremes.

Anderson (1) with four trained observers found the optimal duration of tones for comparison to be one second for the first and one-half second for the second. Short intervals between the tones were better than long. No effect was noted from varying the direction of sound. The accuracy of judgments proved as great under ordinary laboratory conditions as when made within a dark, sound-proof room. Individual tendencies were noted to judge the second tone too high or too low, but no general tendency was detected for the group. Stewart (17) demonstrated individual tendencies to judge weak tones low, and strong tones high; also the reverse. Hancock (4), testing sounds in the region of 128 v.d., found differences in intensity to occasion an illusion of pitch, constant in direction, though variable in amount—a loud sound being judged lower than a faint sound of the same pitch. The average illusion was about 6 v.d. At 512 v.d. a tendency was still to be found, but varied to judgments of higher as well as lower, while at 1,024 v.d. the effect was less disturbing. Sylvester (18), testing the Stern tone variator by the tonoscope, found its greatest accuracy to be attained with 4 gm. pressure and 1.9 mm. mouth-piece gap, but it does not prove to be an instrument for securing accuracy of pitch and interval, since its variations may be from 1.5 v.d. to 10.1 v.d. from their settings.

Rupp's article (14) discusses the chief points to be considered in testing musical capacity. A more detailed and exact discussion of methods is promised in a second paper. Among the problems here considered are the general methods for determining the cognition of tones, determinations of span, thresholds, absolute pitch and timbre. Differential sensitivity, interval sensitivity, cognition of simultaneous intervals, melody, harmony, "takt" and rhythm, and the analysis of sounds are also considered at some length. Balz (2) "is convinced that at bottom music (and all the other arts, for that matter) rests upon the exploitation of that sort of exciting agency which is the 'natural' innately appropriate, and adequate stimulus for the calling forth of an emotion through the excitation of the sense-organs." Thus, specific differences in musical stimuli occasion specific musical emotions. Pieces of music which resemble one another in emotional value will resemble one another in structure. Illustrations are adduced to show that our innate organism responds to certain musical motives, and that our experience develops our sense of emotional reaction. No definite analysis of the structure of the music, or the nature of the corresponding emotions is attempted.

Ter Kuile (5) finds that the ratios of vibration frequency of two or more tones indicates their rank in the scale of consonance when one applies the following formula, where α , β , γ , etc., represent the ratio numbers and p the number of tones in the chord:
$$\frac{1}{\sqrt[p]{\alpha \cdot \beta \cdot \gamma \dots}}$$
.

Upon reduction the result varies from 1, in the case of the unisone, downwards. The octave gives 0.71, the fifth, 0.41, the fourth, 0.29, etc. The series closely approximates the order usually attached to the degrees of consonance. The author would appear to regard this as of physiological significance, the explanation, however, is not quite apparent to the reviewer. Benjamins (3), experimenting with the Kundt dust figures, has found variations in the chief partial which correspond to different vowels sung into the tube. When *u*, *o*, *a*, were sung on different notes the partial was found to descend as the pitch of the note rose, but it remained lowest for *u* and highest for *a*. Marked differences were noted in the results of an adult tenor voice, and the voice of a girl of eleven years. For the former, *a* was between 412 and 1,031 v.d., *o*, between 369 and 611 v.d. and *u* between 288 and 402 v.d. For the little girl, *a* was between 916 and 1,100 v.d., *o*, between 458 and 916 v.d. and *u* at 388 v.d. Other vowel sounds are also reported and we may note

the registration of *e* between 397 and 634 v.d. The author concludes that the mouth cavity changes its form as the pitch of the tone being sung is changed. The vowel clang is therefore not independent of the pitch of the voice, although change in pitch may alter the character of the vowel.

Peterson (12), replying to a criticism of Cl. Schaefer, maintains that their views as to the origin of subjective combination tones are not essentially different. All combination tones, subjective and objective, depend upon periodicities external to the sensory end-organs of hearing. Helmholtz's belief that they are located in the middle ear has been found erroneous, yet the same principle employed by him accounts for their existence in the waters of the cochlea. Raman (13) appears able to demonstrate a wide range of vibrations of the combinational variety by recording photographically the vibrations of a string suspended between the prongs of two tuning forks. The summational vibrations were found to be more frequent than the differential. Among those demonstrated, occur vibrations corresponding to the first difference tone and the simple summation tone. No reference is made to any attempt at demonstrating objectivity of combination tones, and the physical effect of the string which records these additional vibrations is not specifically made clear. Wood (24) gives in brief compass a clear and interesting discussion of the physical basis of music. As is the case with most physicists, he holds more closely to the Helmholtz theories than is entirely warranted by the psychologist's results. Despite this limitation, his little volume may be found helpful to students in the study of audition.

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AFFECTIVE PHENOMENA—EXPERIMENTAL

BY JOHN F. SHEPARD

University of Michigan

Rose (9) reports the results of experiments by means of the dynamograph, on the influence of disagreeable sensory stimuli upon the motor effect of voluntary acts. Series of 6 to 36 efforts were made, giving every other three with or without a disagreeable taste. Results were taken with four sorts of preparation of attention on the part of the subject: (1) simple, without special directions except to pull as much as possible; (2) sensory, the subject's

attention is mainly on the signal and he is directed to react only when the signal is heard clearly; (3) motor, the idea of the movement is to be especially held in mind, with the thought of reacting immediately after the signal; (4) muscular, as (3), but with the development of strain in the muscles which are to be used. The latent time between the signal and the beginning of the reaction, the length of the rise of the curve, the total length of the act, and the height of the pull were measured. The introspections of the subjects indicated that the sensory disagreeableness caused an increase in the motor impulse. Some of the subjects found the disagreeable stimulus to be exciting introspectively; the others found no such effect, but were quite passive toward it. They also observed that the type of preparation of attention influenced the motor effect. In most cases, weak, medium, and strong disagreeableness caused a decrease in the latent time of the reaction. The more actively excitable subjects showed a stronger effect than the more passive ones. Sensory disagreeableness of all degrees and with all sorts of preparation of attention gave an increase in the height of the thrust, the more so the stronger the disagreeableness. Moderate to strong disagreeableness with each sort of preparation of attention showed a shortening of the period of rise of the curve when the subject was of the more active type, but showed lengthening of the rise when the subject was of the passive type. The total length of the act was decreased by the disagreeableness with simple preparation of attention and in the active type of subjects with all other preparations; it was increased with sensory, motor, and muscular preparations with the passive type of subjects. Altogether, sensory disagreeableness of all degrees and with all sorts of preparation of attention caused an increase in the motor effects of a voluntary act.

Leschke (6) has again brought together in tabular form the results of various investigators concerning the correlation of feeling and physiological processes. The table indicates a high degree of agreement among the different writers as to what organic changes accompany each type of mental condition. It seems to the reviewer that there are several more or less erroneous interpretations of the literature where a different report would interfere somewhat with the unanimity of results; but we need now to find just where we stand in the study of this question, and Leschke attempts to do it.

Miss Washburn and her students (3) suggest a measure of the tendency to strong affective reactions, whether of pleasantness or

unpleasantness. The number of indifferent judgments in a series is divided by the number of very pleasant judgments plus the number of very unpleasant judgments. Colors cause a strong affective reaction in more observers than articulate sounds do. There appears to be a tendency for observers who are very sensitive or very indifferent to one kind of material to have the same attitude toward the other kind, but this rule has many exceptions.

Direct verbal suggestion (7) regarding the pleasantness or unpleasantness of a color is usually found to have a positive effect upon the judgments. With a few observers there was a much less decided negative effect.

It requires (8) more time to reach a judgment of pleasant or unpleasant if the degree of feeling is moderate than if it is extreme, and it requires still more time to reach a judgment of indifference. There is no difference between judgments of pleasantness and unpleasantness of a given degree.

In the case of subjects who were without knowledge of the experimental method, the feeling character of a color was found (1) to be influenced by affective contrast with a decidedly pleasant or unpleasant color experienced immediately before.

Feleky (5) obtained a number of photographs of the same individual. Each was taken as the subject endeavored to portray a given emotion. The photographs were presented to one hundred persons together with a list of names of emotions. Each person was asked to select the name of the emotion expressed in each picture. Sufficient uniformity was shown to make the method promise valuable results in the study of emotional expression.

Coover (4) studied the possible justification for the belief in "the feeling of being stared at." Ten students who held such belief acted as subjects. The belief was shown to be groundless. The explanation of the "feeling," was found in nervousness, catching someone staring whose attention had been attracted by the nervousness, attributing objective validity to subjective impressions of imagery, kinæsthetic sensations, and impulses.

According to Benussi (2), the ratio of duration of inspiration to duration of expiration is less before making a false statement than afterward and is greater before making a true statement than afterward.

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AFFECTIVE PHENOMENA—DESCRIPTIVE AND THEORETICAL

BY H. N. GARDINER

Smith College

Two writers treat generally of "feeling" and "the feelings." Smith (13) wants to know what is the "substrate" which "has" the attributes pleasant, unpleasant, etc. After reviewing, criticizing, combining and variously interpreting current theories, he concludes that it is "a spiritual act or self-position," a character which it shares with cognition and conation. Hence it must be "deduced" from the notion of spiritual life or activity. The result of the analysis of this notion is that all experience, in proportion to its perfection, is feeling and, therefore, pleasure. Pain, or non-feeling, is real only as an element in what as a whole is pleasure. A more fruitful method is followed by Müller-Freienfels (8), the genetic-biologic. According to him psychical phenomena are modifications and specifications of an originally undifferentiated consciousness, appearing in us as "organic consciousness." Sensations proper are biologically explicable developments towards the objective side, that of localization, the feelings are developments of the subjective side. They are not, however, sharply divided from cognitive activities, into which, indeed, they enter as constituents—a point repeatedly emphasized—nor from conative, where the distinction is one of relative passivity and activity, and still less

from organic consciousness. Feelings are psychic entities, not mere attributes, are specific in character and are indefinitely various. There are, *e. g.*, innumerable kinds of feelings classed under the categories of pleasure and displeasure; there is no pleasure or displeasure “*an sich*.”

Notable among the contributions of recent years to the psychology of the affective life is the work of Shand (11), whose theory of the sentiments, originally propounded some twenty years ago in *Mind* and since accepted, in whole or in part, by Stout, Westermarck and W. McDougall, among others, is here developed to establish the foundations of a science of character. The problem is conceived as essentially dynamical. The emotions are forces connected with instincts. Their analysis into sensations and feelings having value as reflecting bodily changes is subordinate to the tracing of their tendencies, at first their biological, later their value for the higher ends of character. A fundamental conception in the author’s treatment is that of system. As in the body there are certain greater and certain lesser systems, so in the character. Here there are three orders of such systems: (1) The simplest—the impulses, each including an instinctive or other tendency; (2) the appetites and emotions, including some of the former tendencies; and (3) the most complex—the sentiments, including some of both the preceding systems. The organic laws of character are those of our instincts, emotions and sentiments, and of such laws the author formulates 144. We are reminded of Spinoza, but the method here is entirely different, not deductive, but empirical; the fundamental conceptions are taken as working hypotheses and the conclusions, instead of being considered final, are regarded as always probably in some measure false. This is not the place to refer to the details of an extensive treatise acute in observation, subtle in argument and rich in literary illustration, but the attention of those interested may well be called to the excellent chapter on the temperaments, which are treated from the point of view that a man’s temperament is determined by the “temper” of his emotions, *i. e.*, by the way in which his emotions are felt and manifested. In another direction Müller-Freienfels (9) traces the influence of specific types of emotion and emotional dispositions, as they predominate in individuals and in societies at different periods and stages of civilization, on religion, literature, art and philosophy. In showing the contribution made by each type—emotions of depressed and heightened self-feeling and of the aggressive and

sympathetic social instincts, as well as emotions of the sexual life—the paper is in part a protest against the Freudian tendency to attribute creative functions solely to the erotic impulse. Ribot (10), while also criticizing the attempt to explain everything by the sexual instinct, ascribes to psycho-analysis credit for having thrown light on the processes of affective logic, particularly in its lower forms, and on the processes of creative imagination in its study of dreams. He himself proposes the hypothesis that creative imagination is a form of the transformation of energy and says that this should find favor with the analysts, who ascribe the same origin to creative imagination as to physical procreation.

The amorous sentiment itself is examined by Kostyleff (4, 5). Starting with the view that the synthetic image, objectively a bundle of reflexes, which governs the sentiment, may be wholly or partially unconscious, he concludes, after reviewing recent cases of general, diffuse eroticism reported by the Freudians, that in normal love the "erotic complex" is composed of fragmentary and delicate reflexes associated with a diffuse reaction, and accordingly unconscious. Regarding the formation of the erotic complex he takes sharp issue, in a second article, with the Freudian account of it as derived from infantile eroticism centered, e. g., on the mother, and ascribes it rather to isolated reflexes of a perceptive or emotional order. Balz (1), basing his evidence on general musical experience, seeks to show that differences in the emotional reactions of the trained musical auditor are correlated with specific differences in the various complexes of the air-vibrations, regard being had, fundamentally, to innate organization and, secondarily, to familiarization. Dwelshauvers (2) contends that the sentiment of art, at least in its highest forms, and the sentiment of religion spring from the same movement of sympathy between what is spiritual in ourselves and what is spiritual in the universe as a whole. Siméon (12) discusses the timely subject of patriotism. He finds the usual explanations insufficient and holds that the content of this sentiment is nothing but "the will of a state, of a system of laws" guaranteeing a definite political, social and religious régime, actual or ideal. Its objects are institutions and ideas connected with the territory, not the territory itself. Hall (3) gives a comprehensive study of fears, a "synthetic" study, it is called, because aiming to correlate all the chief lines of investigation of the subject, "genetic," because of its explanatory principles. Fear is defined, in language all too characteristic, as "a protensive or futuristic attitude or orientation."

toward a pejorative state." As against Freud, who interprets its generic form as rooted in sex, its *summum genus* is said to be an inability to cope with life. A list of 136 phobias is drawn up, all duly labeled with Greek names, but the material discussed in detail is grouped under ten heads, one being the polyhyphenated "Rabdo-ballisto-aichuro-acro-merintho-phobias." A vast array of data is brought under survey. The genetic principle is ingeniously applied, being sufficiently plastic to cover symptoms regarded as grotesque variants and intensifications of phylogenetic originals and, again, motor patterns which represent mere scars of ancient fears and which, when called into action, evoke but a faint phosphorescence of the old primordial feeling. The explanations, however, are usually convincing and at worst plausible. At times audacious, as when, e. g., referring the sense of hovering to pelasgic life and that of falling to arboreal, the author on occasion shows commendable caution. Thus, in spite of the evidence which points to an ophidian *Anlage*, which, however, need not be a specific type of imagery, as the basis for the common attitude toward snakes, he confesses that there is something here that we do not know, and a similar hypothesis with regard to an inherited *Anlage* to account for the frequent aversion to house-cats he describes as a *fides quærens demonstrationem*. Incidentally on several occasions he pays his respects to the James-Lange theory; it may hold, he says, for the race, but not for the individual, psychic fears having made the mechanisms. Le Savoureaux (6) in an essay on *ennui* criticizes the view of Tardieu that its primary cause is physical or mental exhaustion and contends that it and fatigue are not only different, but opposed. Its essence is found in progressively arrested tendencies which make their action felt while themselves remaining latent. It is the equivalent in the moral realm of the vague feeling of need in the physiological.

On the historical side Titchener (14), starting from a remark of F. M. Urban's that Cournot's speaking of "sensations" of pain in an essay published in 1851 sounds quite modern, since most writers of his time would have called them "feelings," cites passages from French authors of various schools from Malebranche down to Taine and Rabier which show that *sensation* and *sentiment* were not sharply discriminated and that Cournot himself in the essay in question had no settled terminology. The same writer (15) quotes numerous passages from French and German authors which anticipate in certain respects the James-Lange theory of emotion, is

surprised that James makes no reference to his predecessors and regards his acceptance of the complete novelty of his theory as something of a curiosity. In reply it may be said that none of the writers cited express James's theory as he first stated it. Finally, Limentani (7), in the first book published in Italian on the moral theory of Adam Smith, gives a good exposition of that writer's doctrine of sympathy, connecting it with the fuller account given by Hume, which it presupposes, and pointing out that for Smith sympathy is not so much a special emotion as the echo in the observer of every emotion in the one observed.

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ATTENTION

BY W. B. PILLSBURY

University of Michigan

Nayrac (2) presents a new edition of his exposé of attention, first published in 1906. The main body of the work is unchanged. Two new sections are added, one on the technique of attention, which describes the usual methods of testing attention, the other gives a brief description of a special course of discipline for children, defective in capacity for attention. In addition many references to later work are introduced and the bibliography is brought down to date. Altogether the second edition is some ten pages longer than the first. The work as a whole provides a summary of the work that has been done upon attention in practically all of its aspects. Chapters are devoted to the physiology of attention, its psychology, to the physiological and psychological pathology, and to the education of attention, together with a very brief historical introduction and a brief conclusion. Attention is defined and eulogized as "a general phenomenon, an active mechanism which is characterized by the voluntary or involuntary concentration of our activity, mental and physical, to the advantage of an idea or group of ideas" rather than explained. Nevertheless the author gathers together a large amount of data bearing particularly upon the physiological and pathological phases of attention. Most of the symptoms of nervous and mental diseases are referred to disturbances of attention in its different stages of disaggregation. In the final chapter on education most emphasis is put upon habit, and systems are provided that shall deal both with the physical basis as well as give mental drill. It should be added that the work was awarded the Saintour prize of the Academy of Moral and Political Sciences in 1905 and has an introduction by Ribot, a sufficient guarantee of its importance.

Woodrow (3) offers an elaborate investigation of the effect of distraction upon attention. Starting with the familiar proposition that attention may best be measured by determining its breaking force, he replaces the term distraction for his purposes by detraction and attempts to measure the effect of unfavorable conditions upon the strength of attention, using the reaction time as the prime measure of the degree of attention. The first detractor measured is variation in the interval between warning signal and stimulus.

He finds that there is a quickening of reaction with increase in interval up to two seconds and a regular decrease in quickness from two seconds to 24 seconds provided the interval be increased regularly. If the intervals be given in irregular order the average reaction time is longer than the average for any interval used in the regular series. In the second and third portions he extends the method to determine the varying degree in which the variation in the interval affects different unfavorable influences. He finds that the reaction times to faint lights and to slight changes in the stimulus are increased much more by the unfavorable intervals than are those to more intense lights and greater changes. From this he formulates the law that "the absolute detraction effect of a given detractor of attention varies inversely with the degree of attention upon which the detractor acts." From his results he conjectures that the difference between the simple reaction time with a constant two second warning interval and a reaction with an irregular interval between the warning and the stimulus may be used as an inverse measure of attention. He confirms the conjecture by showing that the ordinary distractions are registered by this index, and that it measures the increase of attention with age. He then applies the measure to determine whether practice has any effect upon attention and reaches a negative conclusion. Neither trained nor untrained subjects show either increase or decrease of attention with practice.

Cramaussel (1) reports observations taken on the respiration and pulse of an infant between seven and ten months. The usual changes are found or assumed; increase in pulse rate at the beginning, a slowing at the end of the attentive period, accompanied by vaso-motor disturbances. Respiration is usually checked both in rate and in amplitude. The changes are more sudden and last longer when the attention is of an affective character, are more prolonged but less striking in intellectual attention.

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CORRELATION

BY JAMES BURT MINER

The University of Minnesota

The explanations of correlation still center around the question whether a common "general" factor or "specific" factors common to various processes are most to be emphasized. Spearman and Hart (24) add another fundamental paper toward their demonstration of the importance of the general factor, the efficiency of the entire cortex. New and decidedly original methods for testing their hypothesis are devised. These involve a "coefficient of depreciation," which measures the difference between the average record of groups of abnormal and normal individuals for the same test. According to their theory this depreciation is generally due to a decrease in the general factor, so that the order of merit of a series of different tests as to their efficiency in showing this depreciation should give a correlation of 1.00 with their rank as measures of the general factor (shown by the size of new "coefficients of saturation"). With certain allowances the correspondence between these two orders of merit for 19 tests is found to be .87. Moreover, the ranking of the tests in the order which they show the general factor with a group of insane cases should correlate closely with the same ranking for a group of the sane. This correlation is found to be .73.

Accepting de Sanctis's suggestion Spearman (43) prefers to call his explanation of correlation the "theory of two factors," general and special. Simpson's coefficients of correlation between mental abilities are tested by the criterion which he and Hart previously set forth in their paper on "General Ability." This demands a correlation of 1.00 between any pair of columns of coefficients, provided that the correlations are to be explained entirely by the general factor. With 23 pairs of columns he finds a corrected correlation of .86. In showing this, however, it must be remembered that he rejects 55 other possible pairs of columns as being too much affected by sampling errors. New coefficients provided by the work of Wyatt, Abelson and Webb are also found to conform to this same criterion. One of Simpson's 91 coefficients, that between two cancellation tests, he finds to be too large to be explained by the general factor alone, and four others between the three memory tests and the two discrimination tests are probably explained in part by the specific factors common to these tests. His earlier criterion

for testing the general factor, viz., the hierarchical arrangement of the coefficients, he now states "has turned out a failure. Not, indeed, that it has been convicted of any error. But it has shown itself singularly open to arbitrary usage." For example, he thinks that the hierarchy is clearly present among Simpson's coefficients, but Simpson thinks not. Contrary to Spearman, Collins (12) finds with his tests that "there is very little in common to all mental functions," and Reaney (39) finds no tendency toward the hierarchical arrangement from her tests.

The eugenists (36) have come into sharp controversy over the question whether the method of correlation has given results which enable them to estimate the relative importance of heredity and environment. With such men as Karl Pearson, director of the Galton Eugenics Laboratory, and Major Leonard Darwin, president of the Eugenics Education Society, opposing each other, the scientific world should be able to decide where the merit lies. Major Darwin contends that "it is impossible to compare heredity as a whole with environment as a whole as far as their effects are concerned"; but Pearson believes that the order of coefficients of family relationships which run about .50, when compared with the order of correlations found to exist between abilities and environmental factors, *e. g.*, mental ability and conditions of clothing, myopia and lateness in beginning school, which show a mean value of about .05, does suggest, when properly understood, the relative importance of "nature" and "nurture." Carr-Saunders contends that in these coefficients "the full strength of inheritance has been compared, not with the full strength of environment, but with the average of a number of small isolated aspects of the latter." Pearson shows, however, that an application of the principles of multiple correlation indicates how the full strength of heredity may be estimated and compared with the full strength of environment. If we raise the average environmental correlation to .10 and the various environmental factors correlate among themselves as low as .50, which is a large weighting against the hypothesis of heredity, then, so far as present results indicate, the full influence of an infinity of such environmental factors could only raise the correlation with environment to .1414 as against the single relationship to one parent of .50 or to two parents without assortive mating of .7071.

Stern (44) considers the significance of the work on correlation in relation to the idea of general intelligence and introduces a conception of weak factors being compensated by strong ones. He

suggests that "a truer picture of the total intelligence of the individual is given by the idea of a mutual balancing or compensation of different capacities than by the idea of their equality or correspondence." Evidence for this compensation is found in the fact that the amalgamated rank order for two tests correlates higher with estimates of intelligence than either test alone or than the two tests with each other. Adaptation of Ries's results is given to demonstrate this. He, therefore, advises that if we wish to gauge general intelligence by tests we should seek that amalgamated combination of tests which correlates most highly with estimated intelligence and not select the tests on the basis of their high intercorrelations with each other.

It is a pleasure to find an exhaustively intensive study of one test—the memory for sentences. Gassmann and Schmidt (20) carry out such a research through three monographs, culminating with the psychological explanation of the correlations found between the extent of the memory, the individual variability, the relative amount of senseless syllables added, and ability in school performances. The type of mind which mechanically and formally reproduces the sentences is compared with that which attends to the content, thus supplying a relatively larger number of sensible syllables. By this and similar analyses the authors conclude that the most significant relationship is that between a large proportion of sensible syllables supplied and a large variability in performance, both showing a certain independence of thought with attention to the content.

When we examine the improvements in method which have been made since the last resumé, we find ourselves getting notably nearer to the goal of measuring causal relations through correlation. The most important contribution is a "Variate Difference Correlation Method" which has been developed co-operatively by Cave, Hooker, "Student" (45), and Anderson (2). The method aims to eliminate the spurious correlation which is due to two factors both changing with time or space, perhaps the most fruitful source of fallacious arguments from correlation coefficients. The procedure consists in correlating successive *differences* of each of the variates until the coefficients tend to become steady. When sufficiently long series are available with biometric data, we may discover whether there is a true relation between two factors independent of their common growth factor. Pearson and Cave (11) illustrate how correlation between tobacco consumption index and savings index

changes from + .98 to - .43 after the spurious time factor is eliminated. The increased tobacco consumption seems, therefore, to go with the "pipe of the unemployed at the street corner rather than the increased expenditure of the fully occupied artisan." Further we find (45) that the relation between wages and marriage rate changes from - .52 to + .55 after allowance for the difference in these variates from year to year. The method is hailed as giving "hope of greater results than almost any recent development of statistics" (11).

Continuing the summary of the mathematical development, we note that Kapteyn (28) supplies for the first time, he thinks, an acceptable definition of a correlation coefficient which is neither 1.00 nor 0.00. He demonstrates an exact statement for " r " which signifies that it is a fraction depending upon the error in the two variates which is common to both of them. In two additional papers (14) Deuchler completes his description of the methods for measuring the relationship of quantities. He gives his own method of measuring the correlation of ranks and compares it with Spearman's two methods, which he thinks are less satisfactory. Contingency and the product-moment formula are also presented with illustrative examples. For those engaged in extensive statistical work the tables which have appeared in *Biometrika* are now assembled in a single volume of about 150 pages of tables and 75 pages of introductory explanation and illustration (38).

Pearson (35) extends his method of determining the correlation by ranks or grades to cases where one of the variates is given quantitatively or by broad categories, the other being given by ranks or by grades. Brevity forbids referring to several other papers except by their titles, which indicate their purposes (9, 23, 27, 37, 40, and 42).

New ways of applying the correlation method show its increasing importance as a tool in psychological investigation. Multiple correlation especially is demonstrating its usefulness in analyzing the factors involved in a relationship. By partial coefficients Hart and Spearman (24) calculate the correlation due to "specific" factors tested, independently of that due to the "general" factor. They find no indication of special powers of the mind even in case of insanity and related maladies which the current view attributes to interference with particular mental processes. On the other hand the depreciation in those tested abilities which correlate most highly with the "general" factor indicates that the insanities

involve a lowering of the whole intellectual level. Wyatt (52) applies multiple correlation to disentangling the common factors reached by four memory tests and finds no general memory faculty. Barrett (4), Collins (12), Hollingworth (26) and Mulhall (31) also find no evidence of faculties, while Downey (17), in a study of reading and writing mirror script and inverted writing, bids fair to shed some new light on generalized habits. Partial correlation disproves the supposition that literacy and school attendance contribute to criminality in Egypt. Although they correlate closely, the relationship is shown to be due to the factor of density of population (25). Regression coefficients permit Elderton (18), with the Glasgow measurements, to present tables for the first time for mean weight for any height from 6 to 14 years of age.

Experimental methods are beginning to be evaluated by correlation. Barrett (4) finds that the more laborious method of paired comparisons, when applied to judging weights, handwriting or beliefs, is in no way to be preferred to the simpler order of merit method. The form of examination based on the Ebbinghaus completion test proves as reliable as the more time-consuming older types of quiz (6). A much simplified form of the McDougall spot-pattern test gives almost the same results as the complicated test (22).

Münsterberg (30) suggests the larger use of descriptions by poets and writers for working out a correlated description of mental traits as viewed naïvely in society. Pannenborg's description (34) of the relationships of wanton acts to personal traits as found in biographies illustrates this line of work. Kellogg (29) also uses correlation in the study of feeling.

The relations of various factors affecting the same process is a fertile field of correlation analyses. In this connection the judgment process comes in for extensive study by Hollingworth (26), Mulhall (31), Bridges (8), and Downey (16). In connection with the memory processes we find papers by Winch (49), Myers (32, 33), Brown (10), Wells (48), and a combined study at Vassar (1). Sex differences are discovered with the three-word test (21) and by Collins (12).

The number of researches in which the correlation between tests or between tested and estimated abilities is presented has become so large that it is not possible to more than list them. Collins (12) publishes one of the most extensive studies on the correlations between school grades and tests of sense discrimination,

attention, perception, memory, association and motor control. It raises the question whether the low correlations found may not be due to using the teachers' grades without conversion. Hart and Spearman (24), with their numerous tests, conclude that their comparatively low correlations of tests with estimates of ability is due to inaccuracies in the latter. Vickers and Wyatt (47) also present an extended study of the intercorrelations of tests. Arithmetical and reasoning tests are studied by Winch (50, 51), Dockerill and Fennings (15), and Davies (13). The inter-relations between the fundamental arithmetical operations as given by the Courtis tests are shown by Bell (5). Arithmetic stands apart in its lack of correlation with school subjects (7). Frailey and Crain (19) study the relations of school standings intensively, but fail to simplify their statements by giving correlations. Baldwin (3) provides the most valuable data available for consecutive measurements on the same children and states some of the observable relations, but without coefficients. General intelligence correlates .32 with ability in group games with allowance for constant age. The importance of estimating the influence of age is shown by Smith's study (41). He demonstrates empirically that brothers and sisters correlate in pitch discrimination no closer than younger and older children from different families. Unless partial coefficients for age constant are calculated, therefore, the size of correlations with heterogenous age groups lacks meaning. Sylvester (46) finds a minus relation, $- .384$, between age and motor control in the form board test.

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TESTS

BY FRANK N. FREEMAN

University of Chicago

There has been manifest during the past year marked activity in the critique of test methods as compared with the elaboration of new tests. About half of the articles which have been used for this report are either reports of experimental investigations made to test the scope or validity of some test method or consist in theoretical discussions of the technique of testing. The other articles contain a description of new tests or of some modification of old ones. About one quarter each have to do with test series and with tests of special forms of mental ability, one third with tests of efficiency in some phase of school work and the rest with general topics.

There is space only to indicate in a word the nature of the articles listed below. Claparède (4) attempts a criterion regarding the basis of proficiency in different tests. Weiss (24) and Kelley (13) discuss the index method of scoring tests. Thorndike (23 and 20) discusses the method of testing by series of graded difficulty. Kehr (11) has arranged three groups of tests of ten each, mostly taken from the Binet series and repeated with different requirements in the three groups, each group being intended for the identification of a three year development period. Buckingham's study (3) is critical and raises certain general questions which are of importance in testing. Pintner's methods (15) and conclusions are called in question by Kelley (13) and the two should be read together. Peterson (14) describes a new test for generalizing ability. Rupp (18) makes an elaborate analysis of musical ability and describes tests, giving some results. Winch (25) describes tests which demand insight into various forms of logical relation. Woodrow (26) describes a new method. The contents of the other articles are indicated by their titles.

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SPECIAL REVIEWS

A First Book in Psychology. (Fourth Rev. Ed.) M. W. CALKINS.
New York: Macmillan, 1914. Pp. xxi + 428.

An introductory text-book that has passed into the fourth edition is its own justification. Miss Calkins's volume is technical without being dry, and entertaining without being superficial. The new edition contains no essential changes either in content or in arrangement from the earlier ones. In the last preface, the author calls the reader's notice to a fuller discussion than before of attention, conception and emotion. A greater systematic consistency has been secured by using the term consciousness as the equivalent of "the self's relatedness to its objects." Other minor changes are noted.

The popularity of the present work need not strike alarm within the breasts of behaviorists and idea-psychologists. A triumph of self-psychology is not thereby implied. Indeed an examination of the text reveals that, aside from the Introduction, the self plays no absorbing rôle. A notable hiatus would be filled if a chapter on the self were really given in which its analysis and the theories of its analysis could be displayed. In the reviewer's experience, as the matter now stands, the references to the self, if taken at their face value, serve merely to give the student a sense of concreteness and of nearness to everyday life. If analyzed, the references can be interpreted as well or better from the standpoint of "idea" psychology.

Probably the weakest points in Miss Calkins's exposition are the chapters on Instinct and Learning, Judgment and Reasoning, and Emotion. Brief comments here will not be amiss. The discussion of instinct is extremely sketchy. This is undoubtedly a result of the self-psychology point of view and of the union of the topic with that of perception and imagination. In the treatment of judgment and reasoning, the author's style loses its accustomed lightness. The spirit of the chapter is more logical than one might desire. The section on emotion is the longest in the book, and yet one misses the James-Lange theory and a reference at least to Shand's theory of sentiments with its social implications.

In the analysis of conception Miss Calkins states that the

"feeling of generality" constitutes a concept of any content with which it fuses: sensation, image, relation, will or emotion ("when I think of fear, the consciousness of generality accompanies a genuine, though certainly faint, experience of that emotion"¹). The full consequences of such a valuable statement are however not developed. If a sensation plus a feeling of generality constitutes a concept, the discussion of conception (in this and in other texts) should not place such overwhelming emphasis upon the image. And in treating of connected trains of thought, the reader should be confronted in unmistakable terms with the existence of sensory thought, *i. e.*, a succession of sensory concepts. This leads up to a reformulation of the law of association as given by Miss Calkins and others. *The revived or recalled element need not be an image.*² It may be, and very often is, a *perceptual experience*. Ability to reinstate a sensation (or other element) depends upon the control that may be exercised over its stimulus. One cannot recall a visual perception because one cannot by willing produce light. (This is true, *mutatis mutandum*, for other senses where the stimulus must be outside the organism.) However the visual sensation of an object may arouse the tactual and kinæsthetic sensations contained in trembling, smiling or in any other activity which has been associated with it. In these cases one can by willing produce the stimulus for the revived sensory experience even as he can for a revived imaginal experience. Speech and affective memory are cases in point. Such a total view might well be termed a "*theory of sensory dominance*."

WALTER S. HUNTER

UNIVERSITY OF TEXAS

Psychological Experiments. J. V. BREITWIESER. Colorado Springs, Colo.: Apex Book Co., 1914. Pp. 187.

This little book containing one hundred and sixty-eight demonstrations and experiments has been prepared for the author's students. Its usefulness to them makes him think that it may supply a long-felt want of other students. There is some ground for this belief. One of the merits of the book is the incompleteness of the description of procedure and results. Enough is given to enable students to experiment but not so much that they do not need to observe and think for themselves. To insure success, a

¹ P. 147.

² See Calkins, p. 116, and Titchener, *Text-book*, p. 378.

teacher is also needed to explain, suggest and supplement. The descriptions of experiments and materials save time for the teacher but do not prevent him from having the work carried on according to his own ideas.

In the beginning general instructions are given students as to how to make experiments and keep records. There is also a brief discussion of statistical methods, terms and formulas and directions for dissecting out the brain and spinal cord, and demonstrating their gross anatomy. There is no discussion of the anatomy of the sense organs, probably because it is expected that that will be studied in the class work carried on in connection with the laboratory course. About half the experiments are with sensations and most of the others with perception, motion, and simple reaction time. A very few are concerned with higher mental processes.

There are no references to authors or books that treat of the experiments. The book has a table of contents and an alphabetical list of materials and the numbers of the experiments in which they are used, but no other index. The printing and binding of the book are decidedly poor. There are also some defects for which the author is responsible that are not merely instances of incompleteness. For example, experiments 111 and 114 are identical in wording and there is no clear indication as to just what is to be done in relation to other experiments. Again, the description of how to make tests of visual acuity is decidedly defective. The usual cards for testing eyes are presupposed. He says, "Proceed from the larger to the smaller characters until a line is reached in which mistakes are made. Move nearer and repeat the experiment. The subject, of course, will then be able to read the smaller characters. The visual acuity is denoted by a fraction of which the numerator represents the distance at which the letters could just be read and the denominator represents the distance at which they should be read." If the test is to be made in this way larger and smaller letters on the chart are useless.

To sum up, the book has nothing original in it and the experiments and directions are not standardized, but it contains suggestive descriptions which may be very useful to students and to young teachers who are working out a laboratory course.

E. A. KIRKPATRICK

FITCHBURG NORMAL SCHOOL

Sex and Character. O. WEININGER. London: W. Heinemann; New York: Putnam, (no date). Pp. xxi + 349.

It seems necessary to assure the reader that the following review is an honest attempt to give an outline of the main argument of Weininger's *Sex and Character*, not a distorted account made up from isolated passages. There is, he tells us, such a thing as pure masculinity and likewise pure femininity, though they never exist in any one individual in pure form. All human beings are mixtures of these two elements in proportions varying all the way from fifty per cent. of each to an almost pure form. Many individuals whom we, on the basis of the mere external appearance of sex, rank as masculine should really be classed as feminine because their composition is more than fifty per cent. femininity, and vice versa. The perfect form of sexual attraction exists only between two individuals whose proportions of masculinity and femininity are such that when added together they yield one hundred per cent. of each. Pure masculinity contains two elements, intellect and sexuality, while pure femininity contains but one, sexuality. The proof that women have no intellect is that they have no memories. Memory is necessarily the prerequisite for logical thought and for ethical action, and a being like woman who has no memory can therefore have neither. Experimental psychologists who think they have shown that women have better memories than men have merely displayed their own stupidity in supposing that such methods as they employ could throw any light on the question. Now memory with its resultant powers of thought and action is the basis of personality, or soul. It follows that women cannot possess personality or soul. While men, therefore, are immortal, women are mortal. With their total lack of understanding or of ideals, and their complete limitation to sexuality as a content of consciousness, they are the source of all the evil in the world. The only hope for humanity is for men to refuse to have any sexual relation with them. That would mean death for femininity within a brief space of years, but men, since they are immortal, need have no fear of the outcome for themselves.

In the last few chapters he takes occasion to satisfy his anti-Jewish prejudice by asserting that all Jewish men are exceedingly feminine. That should of course mean either that all Jewish women are exceedingly masculine, or else that among Jews sexual attraction does not exist. He gives no indication as to which alternative he prefers.

But it is useless to begin pointing out inconsistencies in such a document. The book impresses one as a remarkable record of a paranoiac mind dominated by two obsessions, first hatred of women, and second hatred of Jews. It displays a wide acquaintance with the literature of psychology and philosophy. It is written with a heroic attempt to preserve an atmosphere of dispassionate philosophic discussion, but the serenity is frequently broken by spiteful outbursts about what all women always do, and what no man ever does, which are worthy of any old gossip of either sex. It is only fair to say that the poor young author displayed the full courage of his convictions by committing suicide at the age of twenty-four. The book was first published in Germany in 1907. The only excuse for reviewing it now in this publication is that its six German editions and its translation into English have given the impression that it constitutes a real contribution to the psychology of sex.

HELEN T. WOOLLEY

CINCINNATI, O.

The Brain in Health and Disease. J. S. BOLTON. New York: Longmans, 1914. Pp. xiv + 479.

This is a book of some 470 pages, profusely illustrated, and is to be regarded, in the words of the author, "as a treatise on general cerebral physiology and pathology and not as in any sense a textbook, monograph, or dissertation on mental disease." It embodies the results of his own experience in English asylums for the past eighteen years.

The portion on cerebral function in the normal brain occupies about a quarter of the volume. A quotation (pp. 51-52) may give better than any words of the reviewer an idea of the author's general line of thought concerning the functions of the brain. "I would regard the human cerebrum, not as a sensori-motor, but as an intermediate or associative ganglion, which, on the one hand, receives sensorial impressions and elaborates them, by processes of association, into the physical equivalents of psychic products of higher complexity, and which, on the other hand, to a variable extent controls, selects, and coördinates certain of these equivalents, eventually transforming them into further physical complexes, whose function is to set in action the lower motor centers. On this functional basis I would divide the cerebrum into pre- and post-Rolandic portions, the former of which possesses controlling and executive functions, and the latter receptive and elaboratory.

"I would subdivide the pre-Rolandic part, or frontal lobe, into a posterior or psychomotor area which is concerned with the evolution of such physical complexes as are necessary to give external expression to the results of cerebral association; and into an anterior or pre-frontal area which is able to control, select, and coördinate certain of the results of post-Rolandic cerebral association, and either to allow these to undergo psychomotor transformation or to inhibit this process. Both these functions I regard as proved, and I consider the outer cell- or pyramidal lamina of the cortex to be at least the chief seat of their actual performance . . . and the middle cell- or granule-lamina of the projection areas as the region concerned with the reception and immediate transformation of sensorial impressions." "The inner cell- or polymorphic lamina . . . must be regarded as subserving such organic and instinctive activities as are not acquired by education."

On the pathological side, the author divides all diseases into amentia on the one hand, and dementia on the other. Amentia is defined as "the mental condition of patients suffering from deficient neuronic development" and includes such troubles as recurrent insanity, hysteria, epilepsy, and paranoia. Dementia is defined as "the mental condition of patients who suffer from a permanent psychic disability due to neuronic degeneration following insufficient durability." The point of view throughout the pathological portion of the work is, thus, that of brain pathology and is quite innocent of any appreciative tinge of the more modern psycho-therapeutic thought. Hysteria is, for instance, divided into neuropathic and psychopathic types, the latter including "cases of psychasthenia who are fit subjects for treatment by suggestion, or, *to use the modern terminology*, psychoanalysis and psychotherapy." (Italics the reviewer's.)

R. P. ANGIER

YALE UNIVERSITY

DISCUSSION

A DEFENCE OF PSYCHOLOGY AS SCIENCE OF SELVES

I am writing in reply to the paper on "Psychology as Science of Selves" which appeared in the *American Journal of Psychology* for January under the name of Josephine Nash Curtis. This paper criticizes the teachings of Miss Calkins explicitly, unfavorably

and in minute detail.¹ I am not a thoroughgoing self-psychologist. On the contrary, I have always been proud to wear the colors of the arch-structuralist from whom I received my training. Nevertheless, I feel called to defend self-psychology. My qualification consists in the fact that I believe that I understand Miss Calkins's doctrine of the self better than Miss Curtis understands it. I can, in all sincerity,—at least, so I believe—take the *doppelte Standpunkt* recommended by Miss Calkins years ago. If I be a self-psychologist, I am still at the level of the double standpoint. I have not kept pace with the “increasing claims” of self-psychology. I have never thought for a moment that psychology could be most “effectively” treated if worked out exclusively from its point of view.

Miss Curtis takes up in order the root of Miss Calkins's psychology—namely, her doctrine of the self—her method, her problem, and her results, and rejects or depreciates each in turn. I shall follow the same order.

1. The doctrine of the self is the *crux* of the whole matter. If one can once understand what Miss Calkins means by that self of which one is always conscious, then one finds all her other contentions at least intelligible. The understanding comes suddenly like the reversal of perspective in the staircase illusion. When you have once had the reversal, you can always get it again but you can also go back at will to seeing your staircase in the old way. Miss Calkins's self is the individual (separate) “*I am*,” *I—being conscious—am, cogitans sum*. The self is the knower, the experiencer. How can the knower get out of himself to define himself? Every effort to do so must move in a circle, but to borrow an old figure for a new use, “it is a circle within which everything lies.” Miss Curtis notes that Miss Calkins says that the self cannot be defined, but because Miss Calkins says that everyone knows what the self is, Miss Curtis has taken pains to ask several specimens of “plain man” what they meant by the *I* (p. 73). But why should the plain man be expected to define the indefinable either better or worse than the psychologist? And why should the selfist be expected to define the self any better than the structuralist defines experience? The structuralist says: “We assume that everybody knows, at first hand, what human experience is. . . . Unless we

¹ It can scarcely be alleged that Miss Calkins is the only self-psychologist. Robert Yerkes appears to be another. Cf. his “Introduction to Psychology,” pp. 15, 17, 53, et al. Approximations toward self-psychology are to be found in the writings of Angell, Judd, McDougall and others.

know, by experience itself, what experience is, one can no more give a meaning to the term 'mind' than a stone can give a meaning to the term 'matter.'" The structuralist deals with experience; the selfist deals with an experiencer; neither can define his material. Structural psychology may be greatly preferable to self-psychology—in many respects, I prefer it myself—but the advantage can scarcely be said to rest upon precision of definition.

Having stressed the indefinability of the self, I shall pass to Miss Curtis's complaint that Miss Calkins does not make her conception of the self "clear" (pp. 72-75). If, as Miss Curtis says, Miss Calkins's self is evidently "not merely the sum-total of its perceptions, emotions and the like," how can Miss Calkins make it clear? It is only the sensational and imaginal components of consciousness which can be clear in the technical sense and only in so far as experiences are made up of them can experiences be described in such terms as to arouse clear ideas in the "reader's mind." By *not clear* Miss Curtis may simply mean *inconsistent*, but her insistence that Miss Calkins should at least distinguish the self from things, the subject from the object, the knower from the known, makes me suspect that she, as a sensationalist in psychology and an imaginal-minded person in ordinary life, is craving for the sort of description which in the nature of the case, she can never have, a description which will make the self *anschaulich*.

The last sentence suggests a word or two as to the method by which Miss Calkins finds this self of hers. There are some mental make-ups which have a definite "set" toward sensationalism in psychology. I have one myself. Even when I am thinking about the self, my experience consists not merely of a pretty steady flow of internal speech but also of an eddy of visual images, ill-defined but brightly colored, and of faint dashes of visceral sensation, which come at times with the *but*s and *if*s and the like. I do not find by introspection, in the narrow and standard sense, any non-sensational and non-affective elements in my own experience. Perhaps I do not know what to look for but, in any case, I cannot find any. Yet I am conscious of myself and I find it not by introspection but *in* introspection. Miss Curtis asks: "What answer can Miss Calkins make to the person who says, 'I do not know what the I is?'" The retort is easy. Miss Calkins would ask, "Who is this I who does not know what the I is?" The self is the introspector. When I can see my own eyes without a mirror, then I shall be able to find my own self by introspection. Neither do I find the self by reason-

ing. The fundamental *I am* is not a judgment and far less is it a verbal assertion. It is not peculiar to man as the talking animal; if it is peculiar to him, he must be the only conscious animal. When one is self-conscious in this sense, one is not conscious of being conscious of being conscious in any metaphysical merry-go-round. In Miss Calkins's words, one is "directly" or "immediately" conscious of oneself and this is all that can be said of this form of awareness because it is not like any other. When the self tries to examine itself as knower—a performance which no psychologist but only a philosopher would attempt—it fails because subject and object do indeed "coalesce." Since the self is in some way conscious of itself, it can have itself as an object but not as subject-matter for introspection in the standard sense. Miss Calkins teaches, to be sure, that one may be attentively conscious of self but I do not see how this can be, for attention to the self should make it clear and the self is never clear in the same sense as that in which percepts and images are clear. The stressing and the slurring of the self seem to me something different from attention and inattention. But, in any case, the self can have, since it *does* have, both as object and as subject-matter for introspection in the narrower sense, its own experiences or "attitudes" or "relations." If the scope of psychology is to be confined absolutely to the data furnished by the kind of introspection which can be applied to sensation complexes, then selves in themselves must go, but, far gone in iniquity as I must seem, I do not grant the premise.

I now come to Miss Curtis's criticism of the characters which Miss Calkins attributes to the self (pp. 78-85). It is perfectly true that they do not serve to distinguish the self from ideas and mental functions, that uniqueness seems to reduce to the rather barren character of self-identity and that relatedness does overlap persistence, uniqueness and complexity. I do not understand, however, that Miss Calkins is trying to distinguish the self from ideas or functions or that she means the characters to be mutually exclusive. She is stating properties, not *differentiae*. Thus, one might describe experience as in constant flux without meaning such a description to be definitive. Since the *self's relation to its object* is used as a synonym for *consciousness*, relatedness must, of course, include the (direct) consciousness of persistence and the consciousness (which does not seem to me constant or direct) of uniqueness and complexity. I may say, in passing, that I think it unfortunate that Miss Calkins should use the word *relation* in the sense just

noted and should also treat of *relational* elements of this relation. In the preface to the fourth edition of the *First Book*, she herself has attempted to remove all occasion of stumbling (p. xiii). I think, however, that the absolutely unique subject-object relation should have a term all to itself and I wish that Miss Calkins would fall back on the old term *experience*. Her other synonym, *personal attitude*, I much dislike, both because it suggests *Bewusstseinslage* and because it is symbolized for me by a most unfit concrete visual image, derived, I think, from an old picture of Moses with his arms held up by Aaron and Hur.

To one who understands what Miss Calkins means by the self it seems strangely beside the point to insist that one is as often conscious of one's non-persistence as of one's persistence, and that if one regards oneself as unique, one cannot always regard oneself as persistent (pp. 79-82). It is true that we—as plain men—speak of “losing ourselves” and being “beside ourselves.” It is true that we have selfless moments, in Miss Curtis’s sense of the term self, when we are absorbed in novel-reading. But whatever self-consciousness may mean to the plain man it does *not* mean the same thing to Miss Calkins and to Miss Curtis. To take an extreme instance of selflessness (suggested by one of Miss Curtis’s quotations from James) (pp. 76-77), in the horrid moments of recovery from half-an-hour’s general anaesthesia, the mass of organic sensations may be new to us, and all memory images—even the mental picture of that “outward man” which we tend day by day—may fail, and consciousness may be reduced to the level of an uncomfortable new-born baby’s, but yet Miss Calkins’s self will be there to do the feeling miserable. I think that I understand also what Miss Curtis means by the self and I fully agree with her that we are as often aware of the non-persistence as of the persistence of this self.

I now come to my last point in regard to the self. One of the charges which Miss Curtis presses most earnestly is that Miss Calkins fails to distinguish the self from things (p. 73). How can she? Why should she try? Can any of us put into words the difference between mental process and bodily process? As psychologists do we need to try? The structuralist has experience, a nervous system with its processes, and extra-bodily stimuli, environment, situations. The self psychologist has an experiencer, its experience, impersonal objects, which include nervous systems and extra-bodily stimuli, and personal objects other than self. No scientist is called upon to define his fundamental postulates. This

is axiomatic. The trouble with Miss Calkins is that she has *in full swing* two more indefinables than has the structuralist, namely, the experiencer and the other selves. The reason that I prefer to be a structuralist whenever I can is that I am afraid of indefinables. They lead one into mischief. I fully agree with Miss Curtis that the structuralist method of regard is to be preferred just because it is abstract (pp. 96-97)—*i. e.*, I think it is to be preferred as far as it will go and it will go far. But if one realizes that indefinables are there, one cannot get rid of them; one can only abstract from them. And sometimes they compel one to notice them. I have yet to see an adequate treatment of social psychology by a consistent structural psychologist. To my mind self-psychology is worth while, not because it tells us anything worth knowing about the self in itself, that self which is not open to introspection, but because it gives standing ground for the scientific treatment of the relation of person to person.

2. In regard to Miss Curtis's criticism of Miss Calkins's method (pp. 89-91), I have five points to make:

(1) Miss Calkins indicates explicitly that when she uses the term reflection technically, she means looking-back or retrospection.² Now although the method of the trained observer approximates more and more to true introspection yet the line between retrospection and introspection remains pretty hard to draw. It is not so very long since we were all taught that introspection is essentially retrospection.

(2) If introspection is valid only when it is "attention under instruction and report" how do we ever dare say anything about such elusive processes as pleasantness and unpleasantness? Introspection in the sense of the definition quoted by Miss Curtis is, of course, the standard method of psychology, but to maintain that it is the only method worth applying seems to me to lead to absurd consequences.

(3) Miss Curtis's bald statement that "it is not true that reflection is a method of science"³ is to me astounding. If reflection in the ordinary sense, is a necessary adjunct to observation (as Miss Curtis grants), it is, of course, a part of scientific method. This is not mere cavil on my part. To deprecate "reflection" is to go back historically from Galileo to Francis Bacon.

(4) I never yet saw a classification of emotions, habits, instincts

² *First Book in Psychology*, p. 12, second paragraph, every edition.

³ Second foot-note to p. 89.

or temperaments, structuralist or otherwise, which was not largely a product of reflection in the sense in which reflection is reprehended by Miss Curtis. But this point is simply *argumentum ad hominem* and I will not press it. I am reminded of the old lines:

"Geographers, in Afric's maps,
With bears and lions fill their gaps,
And over uninhabitable downs
Paint elephants instead of towns."

The sword cuts both ways—cuts most of us, in fact. But the mere mention of bears and lions makes me wonder whether Miss Curtis would confine animal psychology to the observation of movement and, if not, how she would outline for it a consistent and fruitful procedure. Even the plainest argument from analogy is reflection, not observation.

(5) Self-psychology is avowedly in its infancy. It seems not impossible that in the future the relation of self to self should be submitted at least to the semi-experimental method of "controlled introspection." I do not think that this relation is entirely open to such introspection but I believe it is partially open.

3. As regards Miss Calkins's problem, Miss Curtis argues that because Miss Calkins holds that self-psychology is closely "allied" to a discipline suggested by Münsterberg and christened "history," and because Münsterberg's problem is to interpret the willing subject, therefore Miss Calkins's interest is primarily in finding "logical" meanings and practical applications (pp. 91-92). To this I can only say that if Miss Calkins's problem is either metaphysical or ethical, she has solved it rather badly and has introduced only a little relevant and a vast deal of irrelevant matter.

4. Miss Curtis's criticisms of Miss Calkins's results reduce to three. (1) Miss Calkins, she notes with surprise (p. 94), treats the conventional list of psychological topics. But why should Miss Calkins refrain from doing so? Self-psychology differs from other forms of psychology in its method of regard but it claims the whole subject-matter of psychology. Why should Miss Calkins not draw from the common stock of results experimentally established? As a matter of fact, she does draw from it pretty liberally—more so than one who reads her books with an eye only for her peculiarities is likely to realize. Incidentally, it may be remarked that not all of her peculiarities are to be laid at the door of self-psychology.

(2) As regards the material peculiar to self-psychology, Miss

Calkins is said not only to speak *ex cathedra* but to speak as if from an arm-chair and the teachings which issue from this place of repose are said to be such as any logician or "even any plain man who is skillful in drawing distinctions" could utter (pp. 94-95). Be this as it may, I do not believe that Miss Calkins would insist greatly upon any one of her doctrines excepting only upon the possibility and the need of having a self-psychology. A style which is as terse and vivid as hers in the *First Book* is apt to ring with a certain tone of finality, which may belie the real attitude of the writer.⁴

(3) Miss Curtis suspects Miss Calkins of an unholy desire to make psychology propædeutic to sociology, ethics and pedagogy (p. 95; cf. p. 92) but hints that much of its material may have been actually filched from these sciences (pp. 97-98). But whether we like it or not, the sciences will overlap both one another and the technologies. It is part of that continuity of nature which led Anaxagoras to say "There is something of everything in everything"; and "Things are not cut off with a hatchet." Self-psychology lies in the border-land between structural psychology and the other *Geisteswissenschaften*. Sometimes I have wished that another name could be found for a study so different as self-psychology in some of its features from structural psychology. Yet it is psychology in the wider sense and it seems to me to have a *raison d'être*. Such studies as Mahaffy's "Homeric Greek" and Taylor's "Mediæval Mind" do not seem to me history pure and simple. If the structural psychologist is to enter the field of social relations at all, he must at least talk of persons and I cannot myself think out the interrelation of persons in terms of a consistent structural psychology.

In conclusion, I wish to mention a point upon which I feel strongly. One can easily understand, upon historical grounds, why the psychologist should love the company of the physiologist and the physicist and should fight shy of the sociologist and the moralist, and studiously eschew the companionship of the philosopher. But at present, there seems to me no good reason for making the border-line between psychology and the physical sciences

⁴ It has occurred to me that an accident of style may contribute to the impression that Miss Calkins sets up her own introspection as authoritative. In describing experiences she habitually uses the pronoun *I* instead of the colloquial *you*, the intimate *we* or the rather awkward *one*. (Thus, for example, "As I look from the sail on the horizon to the rosebush on my window-sill my eyes converge.") Palpably absurd as it is to take this pronoun seriously, yet impressions which will not bear analysis often lead to unjust estimates both in literature and in life.

as tenuous as the boundary between the United States and Canada, and then guarding the opposite border with a double row of fortresses. The most dangerous invaders now to be discerned seem to me to be upon the biological and psychiatric boundary-lines, even if they be not already over and making prisoners in our very midst. But in any case, commerce is usually advantageous even across an armed frontier.

ELEANOR A. McC. GAMBLE

WELLESLEY COLLEGE

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NOTES AND NEWS

PRIZE IN PSYCHOPHYSICS—Professor E. B. Titchener informs us that, owing to the international composition of the judging committee, the award of this prize (see the *BULLETIN*, Jan. 15, 1914) must be postponed till the conclusion of the present war.

THE American Psychological Association and the psychological division of Section H of the American Association for the Advancement of Science will hold a joint meeting in San Francisco, August 2nd to 7th. Full details regarding the meeting will be sent to the members of both associations soon. Announcement of papers offered for presentation at the meetings should be sent to Professor Lillien J. Martin, chairman in charge of the psychological meetings.

A PRIZE of \$1,000 is to be awarded by the American Social Hygiene Association for the best essay on social hygiene for adolescents, to be submitted to the Association by July 31, 1915. Full information may be obtained on application to the Association, 105 West 40th Street, New York City.

We are glad to announce that the report of the death of Dr. A. Marie, director of the psychological laboratory at École des Hautes Études, which was printed in the March *BULLETIN*, is not true. Dr. Marie was wounded, but is now in a fair way to recovery.

DR. M. BERNHARDT, of the University of Berlin, well known for his contributions to neurological literature, has died at the age of 70.

DR. FRANKLIN O. SMITH, assistant professor of education at the University of Utah, has resigned his position on account of present conditions at the University.

PROFESSOR J. MARK BALDWIN has been appointed Herbert Spencer Lecturer for 1915 at Oxford University. He is the first foreigner to hold this position.

THE
PSYCHOLOGICAL BULLETIN

A PRELIMINARY REPORT OF EXPERIMENTS ON THE
STEREOSCOPIC EFFICIENCY OF VISION¹

BY ARTHUR HENRY PIERCE

Writers on stereoscopic vision are for the most part accustomed to assume that a clear perception of an unequivocal solid figure will be sure to result if only appropriately different stereoscopic pictures are placed before the eyes to which they respectively belong. Le Conte indeed writes, "I have heard a few persons declare that they saw no superiority of a stereoscope over an ordinary enlarging or perspective glass; that they saw just as well while looking through the stereoscope if they shut one eye as with both eyes open."² Much less infrequently have many of us, I believe, had experiences similar to that of Le Conte. In my own case this has been especially true when displaying the figures designed to give the picture of a truncated pyramid or, when exchanged, that of a simple tunnel. In both cases students have many times replied to the question whether a pyramid or a tunnel was seen that they could see whichever they pleased, that they saw now one and now the other, though the card remained meanwhile unchanged. Neither form seemed readily to attain any predominance in the direction of the figure which true stereoscopic vision should have produced.

Again, I have experienced much difficulty—and I suppose

¹This paper was read by the late editor of the BULLETIN at a meeting of psychologists at New Haven in 1906. The author probably intended to carry on the investigation, but was either prevented from doing so or diverted by other interests. It seems worth while, however, to print the paper in its present form, the facts presented and the practical suggestions it contains regarding "the stereoscopic limitations of untrained vision" being based on careful experiments, as the records, which are still extant, show.—ED.

²Le Conte: *Sight*, p. 154.

others have had a like experience—in demonstrating the fact that when two blocks of printed matter differently spaced but otherwise identical are stereoscopically united, the resulting perception will show unevennesses of surface. The fact is discovered only after the student is told what to look for, and then only fugitively and after a struggle.

To determine something about the prevalence of this stereoscopic inability a series of very simple experiments was carried out. This we shall call Series I. Then a second series of experiments was undertaken with a few picked subjects in order to ascertain, if possible, the conditions of this inability and whether or not it could be readily overcome.

SERIES I

A. Preliminary Considerations.—If a lack of ability to make stereoscopic fusion is to reveal itself, it will certainly do so most readily and most conspicuously, not with stereograms representing landscapes and ordinary views, but with stereograms of simple geometrical solids. For it is, of course, the *equivocal* nature of such diagrams that will most often cause the stereoscopic inability to betray itself to the investigator. Further, from such equivocal diagrams those should be chosen which possess a strongly predominant form. And, lastly, the stereoscopic card should be so made that the combination give the *non-predominant* form. In this way it seems clear that the maximum of stereoscopic difficulty will be given to the subject and that thus any stereoscopic inability will be forced to expose itself.

For diagrams the Schroeder stair figure and a figure somewhat resembling the Necker cube were chosen. These diagrams were prepared by the aid of photography. In the case of the stair figure the actual photographs were used in the experiment. In the other case line drawings were made from the photographs. Four sets of cards were prepared, the stereoscopic combinations being respectively (1) a pair of stairs, (2) an overhanging cornice, (3) a prism tilted slightly forwards, (4) a prism tilted backwards. Thus, supposedly, two predominant and two non-predominant forms were available for the experiment.

B. Method of Procedure.—The stereoscope was clamped to an upright and set so that the card would be well and uniformly illuminated. The card carrier was adjusted for each subject by means of an excellent landscape stereogram. Then both lenses of

the stereoscope were covered by curtains of black cardboard and the real experiment began. The diagrams were shown in this order:—cornice; prism tilted forwards; stairs; prism tilted backwards. The procedure was invariably to uncover the right eye and the left eye in succession; then, after directing the subject to close both eyes for a moment, both curtains were removed, the subject thereupon looking at the diagram binocularly without restrictions of any sort. The sole directions given to each subject were to look carefully and report accurately. Both eyes were kept open except during the moment already indicated, when it was requested that they be closed. The time of exposure was regulated in each case by the report of the subject. There was no haste, nor was there any delay after the report had been given. No questions were asked except such as were essential for understanding exactly what figure was being seen. Nor were introspections solicited. When, however, any were volunteered, questions were occasionally asked to aid in bringing them to greater precision of statement. But everything was done to guard against the influence of suggestion, "What do you see?" being the constant form of enquiry.

The procedure was "without knowledge" to the highest degree possible. The nature of the problem was not revealed to any of the subjects. Most of them knew in general what equivocal figures are, and they were acquainted with the Schroeder stair figure in its usual form. Several of them remarked that they supposed this photographic representation of the stairs could be reversed. But there was every indication that the subjects were entirely free from any suspicion of what was "wanted of them."

The number of subjects was 100, all of them volunteers from the junior and senior divisions in psychology. Each subject of the experiment was examined quite separately.

Additional information, for possible aid in interpreting results, was secured from each on the following points: Ability to see double images, any special habits in the use of one eye more than the other in microscopic or telescopic work, any inequality in the strength of the eyes, familiarity with the use of the stereoscope.

C. General Results.—I. The Stair and Cornice Diagrams. (1) Monocular views. Total monocular exposures = 400. Stair seen, 396 times; cornice seen, 1 time; a reversing perspective seen, 3 times. The overwhelming predominance of the stair perspective is apparent. (2) Binocular views. (a) Pictures giving stairs when properly combined stereoscopically. Number of exposures = 100.

Stair seen, 97 times; stair changing to cornice seen, 3 times. It is of course evident that in view of the almost perfect monocular tendency to see a stair, this high degree of binocular tendency in the same direction can give no evidence that the binocular vision of the card was stereoscopic in character. Such evidence must be sought in the results from the use of the other card, where the non-predominant form—in this case the cornice—is the true stereoscopic resultant. If the tendency to see the stair perspective there gives place to the perception of the cornice, the evidence is strong that this perception is the result of binocular fusion. On the other hand, if the predominant form—the stair—is still seen, we have evidence that the binocular images are for some reason not fusing. Let us see the results for this phase of the experiment. (b) Pictures giving cornice when properly combined stereoscopically. Number of exposures = 100. Stairs seen, 77 times; cornice seen, 5 times; stairs seen first, changing to cornice, 18 times. That the stairs should be seen 77 times out of 100 seems abundantly satisfying evidence that, with this figure at least, binocular fusions do not readily take place. Of the 18 subjects who first saw stairs and then a change to a cornice, 8 reported that the cornice changed back again to stairs. In these 18 cases I consider it quite impossible to say whether we have a mere reversal of perspective or a partial fusion. In the 5 cases, however, where the perception of a cornice was the unqualified report, I think we may safely conclude that a true binocular fusion took place. Whether this fusion was stable, it was not the purpose of this first series of experiments to investigate.

If this group of 100 subjects is at all representative, we may say that in the case of the stair-cornice diagrams, 77 per cent. of unpractised observers are unable to obtain the perception that represents the stereoscopic fusion of the two monocular images.

In a few cases, however, something occurred which showed that the two eyes were partially coöperating. With the stair diagram, 16 reported that the binocular perception was blurred, or was dimmer than the preceding monocular perception. With the cornice diagram, 14 reported a similar experience, though stairs were still seen, and not a cornice.

Again, with the stair diagram, 12 reported that the figure perceived binocularly appeared clearer, nearer, smaller or more solid, and this points here to a true fusion. With the cornice diagram, 4 reported that the figure perceived binocularly seemed

nearer or more remote, though it was still stairs that were being seen. This fact indicated that partial fusions were taking place, possibly in connection with special parts of the figure, much perhaps as partial reversions of perspective may occur in such a figure as the fluctuating blocks of Beaunis.

II. The Prism Diagrams.—(1) Monocular views. Total exposures = 400. Prism seen tilted forwards, 94 times; prism seen tilted backwards, 204 times; prism seen as equivocal (f. 51, b. 49), 100 times; nothing seen, because of defective left eye, 2 times. With this figure, then, we may say that the backward tilting form is the predominant form, being seen 204 times, while the forward tilting form was seen only 94 times. There is, however, no overwhelmingly preponderating tendency here as there was in the case of the stair-cornice photographs. (2) Binocular views. (a) Diagrams giving a forward tilting prism when properly combined stereoscopically. Number of exposures = 100. Forward tilting prism seen, 91 times; backward tilting prism seen, 4 times; the figure seen as equivocal, 5 times. (b) Diagrams giving a backward tilting prism when properly combined stereoscopically. Number of exposures = 100. Backward tilting prism seen, 92 times; forward tilting prism seen, 2 times; the figure seen as equivocal, 6 times.

Looking at these two sets of experiments with the prism diagrams, we see that the proper stereoscopic effect was reached by 91 per cent. of the subjects in one case, and by 92 per cent. in the other. There seems here to be much more stereoscopic efficiency than was manifested with the stair-cornice figures. To find the reasons for this constitutes a problem by itself.

SERIES II

With these facts ascertained, the next step was to discover, if possible, whether the inability to effect stereoscopic combinations of diagrams could be overcome. And it was hoped that in the course of this study the conditions determining the lack of ability to combine stereoscopically would become manifest, as well as the reasons for the difference in behavior between the stair-cornice diagrams and the prism diagrams.

Four causes may conceivably operate, either singly or in combination, to prevent stereoscopic fusions. (1) Visual habit may have caused the impressions given to one of the eyes to be so far neglected that binocular vision becomes little, if at all, superior

to monocular vision. That most people are right-eyed or left-eyed as well as right-handed or left-handed, is well known to oculists and is indeed clearly enough evident from the frequent inability to see double images. Such a state of affairs could conceivably be corrected by an emphasis, through greater illumination, or otherwise, of the diagrams presented to the neglected eye. (2) There may be a sort of cramp of the muscles of convergence and accommodation. Two forms of this could be supposed. One variety would probably be due to the fact that the subject knows he is looking at a flat card and so makes his optical adjustments conform rigidly to this flatness. The other variety—and to my mind the more important—would be due to the fact that for successful stereoscopy, whether with or without the instrument, the usual synergy of accommodation and convergence must be broken up so that each adjustment may take place independently. With the ordinary hand stereoscope this separation is indeed slight compared with the amount demanded in free stereoscopy. Still some separation, some independent action, must be possible, for accommodation must be adjusted steadily to the plane of the card which convergence changes continuously as the stereoscopic solid is explored from depth to depth. And even if the solid is perceived with fixed and motionless eyes, there must at least be impulses to movements of convergence, and these impulses certainly cannot be effective for perception until they are functionally independent of the accommodation impulses. This binocular cramp of accommodation and convergence would, if it existed, be somewhat similar to the frequent monocular cramp in consequence of which the inexperienced observer finds that an equivocal figure resists the transformation into its other perspective form. Such a cramp ought here to be overcome by devices similar to those commonly employed in monocular work. (3) Each eye may receive its appropriate stimulation, but the various impressions falling upon corresponding points may decline to fuse. This failure of fusion may be due to obscure central factors. (4) A strong and unfavorable pre-perception may be at work in the line of the habitually seen figure. Here we should have, as it were, an apperceptive cramp of such sort that the peripheral material of the perception would be so overlaid by the central supplements as not to obtain its due share of influence in the make-up of the final perception. Such a cramp of apperception should be overcome in part by the subject's knowing precisely what to expect in the stereoscopic combination. Let us see how these suppositions fare in the light of further facts.

Ten subjects from among those previously examined were now tested with some care and with full knowledge of the fact that they were trying to secure a more complete plastic vision. Each subject gave about 45 minutes to this second part of the investigation. Various figures were used in the experiments: two Martius-Matzdorff cards, one showing luster, the other having the differently spaced blocks of print; several specially prepared tunnel and pyramid diagrams, some deep, some shallow; and several stereograms of the stair-cornice variety previously described, all in this instance, however, combining into cornices. These last figures proved far more difficult to see correctly than any simple line drawings that were used.

The general result of this series may be said to be the confirmation of each and all of the hypothetical causes cited above.

1. There were manifestly cases of gross neglect of one eye's impressions, usually those of the left eye. This was evidenced by failure to see double images readily;³ or by the fact that stereoscopic luster was more vividly seen when the white diagram was in front of a particular eye. Confirmation was obtained from the fact that the irregularities of the stereograms with differently spaced prints were seen only after much prompting, and then only with difficulty; and still further from the fact that the tunnel and pyramid figures fluctuated badly, as well as the more difficult stair-cornice figures of the first series. Attempts to counteract this neglect of one eye by strongly illuminating the corresponding half of the diagram led to no improved results. This neglect of one eye seemed due in some cases to visual habits formed in early life under pressure of one-sided astigmatism. In spite of the fact that the latter is now corrected by glasses, the habit of heeding only one eye's impressions still remains. Yet this neglect is by no means always due to any known defect of one eye, and in such cases it must be ascribed, I suppose, to accidental factors which can hardly be traced at the present time.

2. What I have called a cramp of the accommodation and convergence is often apparent. In these cases winking is helpful, as well as slight and slow forward and backward movements of the head or of the stereoscope. It is particularly, I think, the inability to separate accommodation and convergence to the extent necessary for good stereoscopic vision that stands in the way of success.

³ The total number of double images in the experiments was 59; of these the right eye's image was seen 51 times, the left eye's image 8 times.

Subjects feel eye-strains which seem to be due to conflicting impulses coming from these two sources. I am convinced that practice tending to establish an independence and a flexibility of the two movements of accommodation and convergence would do much to improve any case of defective stereoscopic vision.

3 and 4. But there were cases when it was manifest that the eyes were moving properly and that each eye was properly functioning in receiving its impression, while yet the correct stereoscopic solid was not readily seen. I say "readily," because the correct figure could be seen momentarily and when seen was recognized as a more real and solid figure than the one with the reversed perspective which kept presenting itself. The difficulty here seemed to be due to a lack of central fusion, or perhaps to what I have called above a cramp of apperception. I see no way at present of deciding between these factors in any given case. In fact it may well be that the habitual apperception is just what prevents the new fusion now demanded. For example, in several cases the tunnel-pyramid figures gave no trouble, while the more complex cornice figures did, and in all cases one of the cornice figures was refractory. Why this was so, no arrangement of the experiments definitely decided. But it is probable that the preponderating habit of seeing stairs, together with the strong pre-perception aroused by the particular distribution of light and shade presented by the figures, furnished powerful enough central factors to prevent the fusion which these diagrams required. And it was probably just the absence of preponderating visual habit and the lack of marked pre-perception that made the plain line diagrams of the pyramid figures so easy to see.

The truth is that probably all, or several, of the factors indicated coöperate in any given case where stereoscopic vision is impossible or difficult, some one factor perhaps being more responsible for the defect than the others.

The net outcome of these preliminary experiments is essentially a practical one. It is that we have no right to expect that persons will see certain stereoscopic solids merely because the appropriate diagrams are placed before their eyes. And a caution is suggested to the effect that we guard against being deceived by a person's report of what he is seeing in the stereoscope. For it may often be that he is seeing a mere monocular perspective instead of the requisite stereoscopic solid.

GENERAL REVIEWS AND SUMMARIES

AUDITORY SPACE

BY DANIEL STARCH

University of Wisconsin

The problem of Arps and Klemm (1) was to ascertain the factors upon which the perception of the distance of sound depends. The sound which served as the stimulus was derived from a telephone receiver in circuit with an electric tuning fork whose current could be varied by resistances. Stimuli were presented in pairs in immediate succession. The first sound of a pair was always given at the standard distance of one meter and the second at a variable distance, or at the same distance but with variable intensity, or at a different distance with an intensity judged to be equal to that of the first sound. The stimuli were given in the median plane and in the transverse plane on a level with the observer's ears. The results, which are tentative and based on only one observer, indicate that the perception of distance depends on other factors besides the intensity-distance variable, such as change of angle and the binaural ratio of intensity.

Klemm (2) has made a detailed study of the ability of a monaural person to locate sounds. The findings corroborate what has been reported in previous studies of monaural persons and also confirms the assumption in the above paper that there is a distinct factor of distance perception apart from the intensity factor.

Myers (3) sought to determine the effect of the timbre of sound as a factor in localization by experimentally varying the timbre while its position was kept constant. The sound was produced by four Stern tone variators, one giving the fundamental tone and the other three giving different overtones which were combined in various ways. Myers concludes that timbre plays no part in localizing sounds laterally outside of the median plane but does play a part in the median plane, while tactual sensations play no part whatever.

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TACTUAL AND KINÆSTHETIC SPACE

BY HELEN D. COOK

Montclair (N. J.) State Normal School

The literature of the year in this field contains a few detailed experimental investigations, but no startlingly new results. Gemelli's monograph (3), as the title indicates, is primarily a study of the process of comparison, and as such belongs to the psychology of the thought processes. It also contributes directly, however, to two other distinct fields, namely, that of psychophysical methods,¹ and that of tactal space perception. The experimental part of the work consists in a long series of tests, by the method of equivalent stimuli, of the comparative estimation of two-point distances on different parts of the skin. Individual touch-spots were stimulated, and the experimenter was able to obtain simultaneous pressure on the two points with an error of only a few thousandths of a second. The apparatus used is described in a separate article (6), and some of the results obtained are reported in other articles also (4, 5). The most important findings are as follows: (1) Since the more sensitive areas of the skin (as measured by the size of the two-point threshold) overestimate a distance in comparison with the less sensitive areas, the method of equivalents gives a means of estimating the delicacy of the touch sense. (2) Increase in amount of pressure applied to the two points causes an increase in the apparent distance between the points. (3) The discrepancy between two tactal areas is increased by anything that renders the judgment more difficult, e. g., the discrepancy between forehead and forearm is increased when the latter is displaced out of its normal position. The facts noted as (1) and (2) above are, of course, not new to psychology. The first has been known since the time of

¹ For a detailed review of the monograph, see FERNBERGER, S. W., *Amer. J. of Psychol.*, 1915, 26, 300-302.

Weber, and the second was reported by von Frey and Cook in 1911.² In regard to (3) it may be said that Gemelli thinks that the increased underestimation of cutaneous distance on the arm, when the latter is out of its normal position, is due to an increase in visual imagery under these circumstances, but the data seem to the reviewer to be open to other interpretations. Moreover, this explanation of Gemelli's is in at least partial disagreement with Fitt's conclusion (2) that the estimation of cutaneous distances is made more accurate by the presence of clear and vivid visual imagery. Fitt agrees with Gemelli that the over- or underestimation of cutaneous distances varies directly with the size of the two-point threshold. Areas with a small threshold overestimate, areas with a large threshold underestimate, and certain areas, called "indifference points," having a threshold of a certain medium size, estimate cutaneous distances correctly as compared with visual distances. The location of these indifference points, and the size of the threshold at these points, varies from subject to subject. Practice causes a decrease in the amount of underestimation, in some cases even changing it to an overestimation. This is what one would expect, since (as shown by Dresslar and others) practice ordinarily causes a decrease in the size of the two-point threshold.

Toltschinsky (7, 8) reports a detailed determination of the "æsthesiometric field" around a given point in the palm of the left hand. He finds (1) that the field varies somewhat from subject to subject, but for the region investigated approaches more or less closely to a circular form; (2) that the æsthesiometric fields of near-by points are not juxtaposed but overlap; (3) that irregularities in these fields, while perhaps somewhat influenced by articulation, etc., are not exclusively controlled by such factors; (4) that, therefore, the conception of "local signs" needs revision (cf. Ponzo's work on localization in the intercostal spaces and on the forearm).³

Bourdon (1) contributes the only study of the year in the field of kinæsthetic space perception. His chief conclusion is that cutaneous sensations are not the means by which we perceive the movement of the whole body in a straight line. Since his work has already been reviewed,⁴ a more detailed report seems unnecessary here.

² *Zsch. f. Biol.*, 1911, 56, 572.

³ Reported in this *BULLETIN*, 1914, 11, 238.

⁴ The *BULLETIN*, 1915, 12, 117.

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SPACE ILLUSIONS

BY HARVEY CARR

University of Chicago

While reading with the sun shining in his face, Giltay (4) noted that the letters became tinged with a vivid bright red while the white paper background was not so affected. The red disappeared immediately when the eyes were shaded by the hand. Edridge-Green (2) gives the following explanation of the phenomenon in a subsequent note. The retina is flooded with red light due to the passage of light through the lids and the coats of the eyeball. That falling upon the retinal area stimulated by the white light from the paper is so diluted that it is invisible, while that falling upon the areas corresponding to the black print is not sufficiently diluted as to render it imperceptible.

Giese (3) attempts an analysis of the Zöllner pattern by presenting the parallel components in succession. He used two parallels with the transverse lines, two straight parallel lines, and one transverse figure in conjunction with a straight line. He studied the effects of simultaneous *vs.* successive presentation, a variable time interval between the exposures of the two components, a horizontal *vs.* a vertical position of the figure, and monocular *vs.* binocular observation. Practice decreased the illusion for all conditions, successive presentation decreased the illusion for all conditions with the single exception of monocular observation of

the figure consisting of two transverse components, increase of the interval between exposure decreased the illusion up to a certain time limit for all conditions studied, and monocular observation effected a decrease except for the one figure. When a simple line was used as one of the two components, the size of the illusion depended upon the temporal and spatial order of the successive presentation. The figure consisting of two transverse parts gave an illusion twice that in which one part consisted of a single line for monocular conditions of observation, but there was no difference between the two figures for binocular observation. This work impresses the reader as a careful and well controlled bit of experimentation.

Schwartz (6) studied the effects of hypnosis upon the Müller-Lyer figure. He used the three standard forms of the figure in which length of line and size of angle were varied. The subjects were untrained and knew nothing of the illusion. In the hypnotic conditions the subjects were told that they would see merely a straight line and nothing else. Their judgments were made under normal, hypnotic and posthypnotic conditions. They were also given a series in which they were allowed to see the arrow head lines, but were instructed to ignore these lines in giving their judgments. The illusion obtained for the hypnotic conditions, the results being similar throughout to those obtained for normal conditions. Abstraction from the arrow head lines decreased the illusion to some extent. The facts indicate to the author that the illusion is primarily perceptual and not judgmental in character. The paper contains an excellent statement and critique of the various theories of the Müller-Lyer figure.

Tichý (7) investigated reversible perspective as represented by the Beaunis cubes. He used subjects with and without geometrical training and before and after practice. He varied the position of the figure, its complexity, and the arrangement of shading. Length of observation and conditions of fixation were also altered. The procedure, methods and conditions of the experiments were not so described that one can render a confident judgment as to the validity of the results obtained. The author concludes that fixation (the Wundtian principle), accommodation, and habit and imagination are the factors involved. Wundt (8) in a short note criticizes the method and results of Zimmer on these reversible illusions and reiterates his former explanation in terms of fixation and association.

Müller-Freienfels (5) criticizes associationalism as applied to

perception, recognition and illusions, and applies the recent concept of attitudes to the problems of pathological illusions. Perception is sensation plus motor and feeling attitudes, and feeling is used apparently in a very general sense. Pathological illusions are due either to deficient sense data due to defective senses, or to abnormalities of attitudinal reaction to normal sense material. Illustrations of both classes are given. In opposition to the imaginal explanation of recognition, he cites the case of a patient who could recognize places when remembered and imagined but not when perceived.

Benussi (1) gives a critical comment on various features of Bühler's work on *Gestaltwahrnehmungen* in the light of Benussi's own investigations and theories previously published. The material of the paper hardly permits of an adequate summary.

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VALUES

BY WILBUR M. URBAN

Trinity College

A report on values for a psychological journal becomes increasingly difficult. The philosophical literature becomes more and more important, but the purely psychological studies grow less and less. The trend is away from "psychologism," and it is probable that psychological analysis has said very nearly all it can, for the present at least.

The two sources from which further light may come are possibly the experimental and abnormal. The expectation that the experimental methods of the *Denk-psychologie* would be applied to *Wert-*

psychologie also, has now been realized in a study of Th. Haering in Külpe's laboratory at Bonn in 1911-12 (8). So far as analytical psychology goes, his results are wholly negative. "Everywhere we meet with valuations but never with the constitution of a value." "No analysis of a valuation ever gives us a complex in which values are not presupposed." He finds experimental evidence for believing that simple valuations may be intellectual as well as emotional and argues for a specific value-judgment. He concludes that the value of analytical psychology for systematic theory of value is slight, and that explanation of values must be in genetic not analytical terms. An evaluation of this work of some three hundred pages and covering all the fields of valuation is obviously impossible here and must be reserved for another occasion.

The possibilities of the Freudian analysis for our problem have been recognized by Ribot (16). He holds that "psychoanalysis, in consequence of the great importance which it attributes to the affective life . . . has contributed much to the *logique du sentiment* without specifically having this end in mind." He recognizes the light thrown upon "value-movements" (substitutions, transferences, fusions and interversions of values) by Freud and Mader, but denies the exclusive rôle which they give to the sex instinct.

Two points in current philosophical discussions have interest for psychology. In 1913 the Philosophical Association made value its central topic and sought to reach a definition independent of the prejudices of the schools. The cleavage in opinion (between "subjective" and "objective" definitions), represented by Perry (15) and Sheldon (19) showed itself, however, irreconcilable in the discussion that followed. Of interest also are certain discussions of the "value-judgment." The weight of opinion is negative, as shown by the article of D. W. Fisher (7) and the paper of Perry referred to, it being held that the so-called value-judgment is either merely an expression of feeling or a truth judgment. Haering's view that this conclusion rests upon a misapprehension of the psychological nature of the judgment and of value also, is shared by the present writer.

The movement away from "psychologism" is marked by an increased emphasis upon the *a priori* aspects of valuation. Two studies will serve to illustrate a tendency more widespread than the printed results as yet indicate. Max Scheler in a contribution of genuine merit (18) argues for an intuitive basis of valuation, "the true seat of all values *a priori* is the cognition or vision of

values which builds itself up in feeling and preference and ultimately in love and hate." Even more important is a book by Theodor Lessing (11). While denying any *a priori* knowledge of the matter of fact of valuation, he finds certain formal principles of "pure" value presupposed in all empirical valuation. In an earlier review (in this journal) of papers that now make part of this book, the present writer failed to see their real importance, and is glad now to accept, in principle at least, their main contentions. The book is full of acute psychological analysis and its suggestive value can scarcely be overestimated. Another contribution in this same line meriting study is that of A. P. Brogan (2).

Discussions of special problems are many, but can be merely mentioned here. Articles by M. R. Cohen (4), H. M. Kallen (10), H. C. Brown (3), A. Liebert (12) and the aforementioned paper of Fisher, discuss the relation of value to existence from different points of view. Classifications of values are attempted by H. Rickert (17) and J. S. Moore (13, 14). E. B. Talbot's (20) study of the relation of time to value, the first attempt to treat this problem in any but the most general fashion, merits particular attention. The conclusion that value demands the reality of time and that time adds something to value, seems justified by the analysis.

Several books in which the value-problem is fundamental require notice. J. M. Baldwin (1) maintains the thesis that in the æsthetic experience is to be found the reconciliation of fact and value, and in so doing develops the most important recent systematic study of values. T. DeLaguna (6) has written the first Ethics in which the value concept is central. More suitable as an introduction than text-book, it is unfortunate that it should lack all reference to the more technical studies upon which the author has largely drawn. The relation of economics to ethics and to value-theory generally is ably discussed by B. Croce (5) and J. A. Hobson (9). Whereas the abstractness and unreality of the traditional concepts and laws of economics are held by the former to be ground for their exclusion from a philosophy of value, for the latter this same fact leads to a demand for a restatement and humanizing of the definitions of utility, cost and value.

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PSYCHOLOGY OF TESTIMONY

BY GUY MONTROSE WHIPPLE

The University of Illinois

Contributions to the psychology of testimony during the past year have been rather more interesting and ingenious, though less numerous, than during recent years. Take, for example, the work of Benussi (1), at the psychological laboratory of Graz, who used a Marey pneumograph to trace curves of respiration while his subjects read off or described the contents of small cards (letters, digits, drawings). On half of the cards, taken in chance order, was a symbol meaning "lie," whereupon the subject had deliberately to

falsify his statements concerning the contents of the card. A "jury" of a dozen or more auditors judged each *Aussage* as "lying" or "telling truth." The net results were: (1) The human jury, taken on the average, made little better than a "chance shot" (about 55 per cent. right cases); (2) the mechanical jury (pneumograph) was practically infallible (nearly 100 per cent. right cases); (3) it also distinguished between good and poor dissimulators; (4) false statements made with full knowledge that the auditors knew their falsity leave the same records as truthful statements, so that the emotional status of the liar is the essential element in his detection; (5) attempts of the subject to modify breathing do not destroy the significant feature of the respiratory tracing which consists in this; that the ratio between length of inspiration and length of respiration is in lying greater after than before the statement, and in truth-telling greater before than after the statement.

Hélène Lelessz (7) showed two pictures to 124 persons of both sexes, aged 10 years up, and secured a narrative and deposition after the usual *Bild-Versuch* method. Her data were then subjected to the usual formulas to compute range, spontaneity, fidelity and other coefficients of report, but with the added feature that each subject was catalogued according to his intellectual type (as judged by his report). Five types were discovered: (1) the descriptive, (2) the superficial, (3) the intelligent, (4) the interpretive and (5) the ambitious. The meaning of these terms is fairly obvious. The superficial type reports only the outward aspects of the picture, is found in 27 per cent. of the subjects, and is three times as common in children as in adults. The interpretive (subjective) type, resembling Binet's imaginative or poetic, is found in 24 per cent. of the subjects, the descriptive in 10 per cent., the intelligent in 30 per cent. and the ambitious in but 3 per cent. This last is like Binet's erudite type, plus a touch of pretence and showing-off. The author believes that a knowledge of the type to which a witness belonged would enable a judge to appraise in advance the probable reliability of his testimony. Her own qualitative evaluation assigns, in arbitrary units, the values: intelligent 300, descriptive 262, interpretive 208, superficial 160.

Feingold (4) experimented upon the recognition (identification) of picture post cards when displayed in a setting of other cards. It was shown that the degree of recognizability is inversely related to degree of similarity. The experiments were then directed toward the question whether identification would be easier if the object

were in its old setting or in a new setting, and the ultimate conclusion reached is that identification is facilitated by maintaining the original setting, while little danger exists of making false identifications on account of using an old setting. The bearing of the experiments upon testimony involving identification of suspected characters is obvious enough.

Boden (2) employed a new form of testimony experiment, which he regards as more useful than the picture test. The subject-matter was a prearranged dialogue concerning a business transaction (like sub-letting a house or contracting for the retail handling of an article of commerce). The auditors wrote at once an account of the conversation as they had understood it. There was (unfortunately, it seems to me) no time-interval and no interrogatory. The chief conclusion is that witnesses do very well with such material (better than with the picture test, because of the more realistic, and also more abstract character of the material), yet fail when the presented material is obscure (here intentionally) in that they do not report the obscurity, but unwittingly take sides and color their reports. In a doubtful issue they appear to take sides about evenly. Of course, it is just these obscure points that are often most important legally.

Kobler (6), at a meeting of a legal society at Vienna, carried out cleverly a prearranged scene which included interruptions of a colleague's address and a caustic exchange of remarks, verging on insults and threats. Everything was done to secure realism. Several weeks later actions were brought before two tribunals—one of three laymen versed in psychology, who were to regulate the proceedings as they saw fit, the other of three professional judges, who were to follow legal forms strictly. Each tribunal was to examine the same witnesses and to arrive at a finding as to the facts of the original scene, to render a verdict and to determine damages. The two courts reached rather similar results; their findings were condensed, simplified and somewhat distorted in comparison with the actual occurrence. Analysis of the testimony confirms previous conclusions that excitement improves observation and memory of witnesses up to a given point (variable for different persons) and impairs it beyond that point. Dauber's demonstration that agreement of witnesses may mean agreement of erroneous testimony is again confirmed.

Kati Lotz (8) lost her umbrella and concocted an article on the fallibility of human testimony from her experiences in recovering it.

Stress is laid particularly upon the point that here were witnesses without the slightest intent to deceive, that they would have impressed any court as being absolutely impartial and unprejudiced, but that, nevertheless, they were "prejudiced" by their previous knowledge of her habits with respect to umbrellas. The moral is that in reporting a seemingly isolated item about a well-known person, one's account is unconsciously colored to accord with one's general knowledge of the person.

Du Bois (3) discusses in a rambling manner the position of the juror. His general contention is that the juror is asked to perform a delicate bit of work that should demand optimal conditions for passing judgment, but is harrassed and bandied about and generally irritated by conditions of jury duty until his whole mental attitude is out of joint.

Friedrich (5) publishes the prospectus of a sort of continuation course for jurists and public officials in conjunction with courses in political economy and allied lines held at the Cologne *Hochschule* in 1914-15. The plan calls, among other things, for lectures, discussions and experiments upon the psychology of court officials, the psychology of testimony, the worth of children's testimony, etc. As a plan to acquaint legal authorities with what men of science are trying to do in the fields of criminology and applied psychology, this surely deserves the attention of some of us on this side the water.

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SUGGESTION

BY WALTER DILL SCOTT

Northwestern University

Hilger (4) uses the word suggestion in the sense of the dynamic nature of ideas. He expresses this as follows: "Every idea has a tendency to realize itself." The idea may be in the focus of attention, as in expectancy; or in the margin of attention, as in habit. Association of ideas is also given as an illustration of the working of suggestion. According to Hilger, suggestion is not only a normal mental activity, but it includes most all normal mental activity. Hirschlaff (5) regards suggestion as distinctly abnormal and injurious. Although he presents an admirable review of the literature upon suggestion, his attention is directed exclusively to illusions or deceptions produced by suggestion. Accordingly, he condemns all attempts to use suggestion in the education of youth. Alrutz (1) thinks of suggestion as abnormal and as confined to the production of extreme physiological results. He presents evidence to show that suggestion may produce a blister on the skin in the absence of any physical stimulation. He also presents evidence to prove that, even when the skin has been burned, suggestion may keep the skin from blistering.

Münsterberg (6) analyzes the process of suggestion in a way that should be observed by all writers on the subject. He insists that "suggestion is a proposition to action." The act may be overt or merely an attitude or incipient action. A mere idea resulting from the act or word of another is not to be classed as a suggestion unless the idea includes belief and the attitude of belief. Another distinction is that in all suggestion there is an overcoming of resistance.

The research made by Edwards (3) is the most important contribution to the literature of suggestion appearing during the year. He made an attempt to carry out the complete program of the structuralist in the study of suggestion. The following quotations express the purpose and results of the work. "No one, we believe, has attempted by means of careful introspection to study the suggested consciousness itself. It is matter of common experience that suggestion may arouse, deflect or inhibit movement; it is equally clear that suggestion may change the meaning of a perception or idea by shifting its content, that is, by giving it a new associative setting. But if we ask whether or to what extent sug-

gestion may bring about intrinsic changes in conscious content, we receive only partial and incidental answers. A continuously rising tone, for example, is presented under the suggestion that the pitch is falling. The observer reports a drop in pitch. Has he, then, heard what he reports, or is he subject to an illusion of judgment? In connection with sensation, especially, do we find equivoval statements and a lack of experimental study. . . . The experiments are, therefore, planned to favor sensory results. The questions for which we seek an answer are the following: Can verbal suggestions do the work of an adequate sensory stimulus? What percentage of judgments can be inverted, when supraliminal charges of sensory stimuli are used? . . . What are the conscious processes present when such inversions are made? . . . We do not hesitate to draw the conclusion that, in certain departments of sense, a verbal suggestion may arouse conscious processes which are, phenomenologically, identical with those ordinarily aroused by an adequate stimulus or change of stimulus. . . . No proof was needed that observers are suggestible. We were, however, surprised at the potency of suggestion in the case of observers who had frankly avowed suspicion."

Ash (2) gives simple and practical directions for the treatment by suggestion of different classes of diseases and different types of patients.

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SPECIAL REVIEWS

An Introduction to General Psychology. R. M. OGDEN. New York: Longmans, Green, 1914. Pp. xviii + 270.

This book illustrates anew the variety of aims and content which characterize our elementary courses in psychology, if text-books are representative of these courses, and they are likely to be. There is no standard course in psychology. This fact may have its advantages. It is disadvantageous in advanced courses and in subjects such as education and sociology which depend on some psychological preparation of their students.

Recent text-books, however, show that there is more general agreement in making the elementary course in psychology distinctly psychological and the present author is in accord with this tendency. To quote from the preface of the book:

"It has been my experience that so much time was consumed in the study of the nervous system, and of the experimental data of sensation and perception, that in a brief course no adequate consideration could be given to mind as a whole, and to the important topics of personality and character. . . . The average student does not go beyond the first brief course. He does, however, frequently elect further work in philosophy and education, sociology and biology. In coming to these subjects he should bring with him psychological conceptions of a general sort that will be useful to him."

In carrying out the purpose the author has omitted any study of the nervous system and of the anatomy and physiology of the sense organs and has given less than thirty pages to the discussion of sensations.

The second purpose of the book is one which is more open to question and will meet with more opposition, as indeed the author has anticipated.

"The second motive for this book was my conviction that the time has come when we must modify some of our psychological principles and conceptions, with reference to the more recent investigation of the thought-processes. . . . For one who is convinced that new principles of interpretation are now demanded, it

is no longer possible to teach the old psychology, in which sensation and association are the chief foundations."

One other citation, in this instance from the introductory chapter, will illustrate the purpose and character of the book.

"We shall, therefore, treat mental activity as a third phase of our study, and shall endeavor to show that mind involves processes which are not merely mechanical in the sense that the physical and chemical processes of the nervous system presuppose, but which are in a real sense *purposive* in their determinations. . . . The consciousness with which we have to deal appears in a physical setting, and is in a large measure controlled and determined by this physical setting; but not entirely so, because the laws of physics do not permit an adequate explanation of that unique feature of mental happenings,—a feature which has its analogue in all manifestations of life,—namely, its *purposive aspect*."

Whatever the ultimate merit of these views they have led the author to a fresh treatment and interpretation of the facts of mental life. It is questionable, however, whether sufficient background is given the beginner to appreciate the points at issue. A more detailed discussion of the suggestions in the speculative psychology and of the experimental conditions which have led to these observations in regard to the thought processes might have been helpful to this end.

The book is divided into four parts, (1) on the problem and methods of psychology and the nature of consciousness; (2) on the "analytic facts of mind," sensation, image, affection, and thought; (3) on the "synthetic facts of mind," attention, memory, perception, ideation, reaction, and emotion; and (4) on the "issues of psychology," with chapters on mind and body, and personality and character.

The discussion is clear and well organized, although too often abstract and schematic and lacking in illustration. The shortening of the book by the above noted omissions should have given opportunity for more facts and illustrations of a distinctly psychological sort. In fact the great brevity of treatment throughout the book will bring it into criticism. There are less than 260 pages of text, with less than a dozen pages on vision, nine on hearing, six and a half on other sensations and fourteen on the attributes of sensation. There are about seventeen and a half pages on attention, eighteen on memory, sixteen on emotion, and twenty-three on hypnosis, multiple personality and insanity. There is some lack of balance

in the relative length of the discussion of these last subjects although the treatment of "personality" under which they are subsumed is one of the commendable features of the book.

The book will require a good deal of supplementation from the side of the instructor and in the form of assigned readings, and this is, doubtless, the author's intention. It puts in the hands of the beginner a discussion which because of its brevity and conciseness he can master in its entirety, but he should certainly be expected to master a good deal more in the course of a semester's work.

W. F. DEARBORN

HARVARD UNIVERSITY

Educational Psychology, Vol. 2. The Psychology of Learning.

E. L. THORNDIKE. New York: Teachers College, Columbia University, 1913. Pp. xi + 452.

This voluminous book constitutes the second volume of Thorndike's three-volume work on educational psychology. The first volume, *The Original Nature of Man*, was published in 1913; and the third volume, *Individual Differences and Their Causes*, appeared under the general title *Educational Psychology*, in 1903.

The present volume "presents the results of psychological studies of human learning, and organizes and interprets them for students' use." Its twelve chapters bear the following titles: The Laws of Learning in Animals; Associative Learning in Man; Learning by Analysis and Selection; Mental Functions; The Improvement of Mental Functions by Practice; The Amount, Rate and Limit of Improvement; The Factors and Conditions of Improvement; Changes in Rate of Improvement; Improvement in Informational, Appreciative, Analytic and Selective Functions; The Influence of Improvement in One Mental Function upon the Efficiency of Other Functions.

The author first points out that "the intellect, character and skill possessed by any man is the product of certain original tendencies and the training which they have received. His eventual nature is the development of his original nature in the environment which it has had. Human nature in general is the result of the original nature of man, the laws of learning, and the forces of nature among which man lives and learns." These original tendencies of man not only constitute an enormous fund of connections between situations (furnished by physical forces, the behavior of other men, etc.) and responses of which the human creature is capable, but

they also include certain tendencies in virtue of which modifiability or learning itself becomes possible. These latter tendencies are best conceived in the form of the three laws of (a) readiness, (b) exercise and (c) effect: (a) When any conduction unit is in readiness to conduct, satisfaction results from conduction and annoyance results from non-conduction; but when not in readiness, conduction is attended by annoyance. (b) Modifiable connections are strengthened by use and weakened by disuse. (c) When the making of a modifiable connection is accompanied or followed by a satisfying state of affairs, the connection is strengthened; when accompanied or followed by an annoying state of affairs the connection is weakened.

In consequence of the operation of these three laws, the original tendencies are strengthened and preserved or weakened and eliminated; and man is thereby enabled to acquire connections which are productive of appropriate behavior. The consideration of their operation in detail, and of the results to which their action leads, is one task of the volume under review; its second and larger task consists in presenting and interpreting experimental data regarding the nature of various "functions" or "abilities" and their improvement by practice.

The complexities of human learning can best be understood from an examination of the behavior of the lower animals as they learn to meet certain situations in modified and more remunerative ways. Experiments with the chick, the turtle, and the kitten are cited to show the operation of the laws of readiness, exercise and effect, uncomplicated by any pseudo aid from imitation, ideo-motor action or superior faculties of inference. Certain states of affairs satisfy the animal; others annoy it. Of the bonds which the animal's behavior makes between a situation and a response, those grow stronger which are accompanied by satisfying states of affair while those accompanied by annoyance weaken and disappear. The bonds are strengthened by exercise and weakened by disuse. Such is the sum and substance of the bulk of animal learning.

Five secondary principles are found to be fundamental not only to animal but also to human learning,—a capacity of multiple response, a coöperation of the learner's attitude with the external situation, a predominant influence of certain features of a situation, a responding to new situations as to similar older situations, and a shifting of the response from one situation to another.

In certain instances, human learning consists in the forming of

connections of the animal type. But three other and higher stages of learning may also be differentiated: the forming of connections which involve ideas; the forming of connections which involves a process of analyzing or abstracting; and a highest level which involves selective thinking or reasoning.

The process of learning consists simply in making and keeping connections and readiness to conduct; and the result is a mass of organized and unorganized tendencies, which are so numerous and so complicated that it seems impossible even to enumerate them. Psychology has never enumerated or classified the total number of mental functions; it has contented itself with merely considering certain vaguely defined groups of tendencies, describing them roughly and observing how they change in certain important respects, notably in their efficiency in producing some desired result in living. Thus the terms intellect, character, skill and temperament have been employed to differentiate four great groups of connections. Within the sphere of intellect, such terms as information, habits, powers, interests and ideals go a step farther in delimiting certain groups of connections; such terms as ability to add, ability to read, interest in music, courage, and business honesty refer to compound tendencies or groups of connections which are rather narrower than those listed above and which cut across them in various ways. In a discussion of mental functions, the author is, therefore, obliged to content himself with such vague, composite functions as investigators have attempted to study,—adding, telegraphing, typewriting, and the like. And in the study of mental functions, external observation proves to be the sole reliable method,—the condition of a mental function being revealed by whatever of its results are open to observation by any competent student.

The author cites copiously from investigations which have dealt with improvement in simple sensori-motor functions, improvement in the observation of small visual details, improvement in substituting, translating and associating, improvement in typewriting and shorthand, improvement in ability to memorize, improvement in mental multiplication, and improvement in reading a foreign language. From his discussion of the findings of these various investigations, he concludes that: (1) Improvability is a universal characteristic of modifiable bonds from every group of situations; no mental function has ever been deliberately practiced with a view to improvement and with proper opportunity for the law of effect to operate without some improvement resulting. (2) The rapidity

of improvement in these experimental investigations is very much greater than that shown by children in school, by workers at trades, and by all of us in the learning of ordinary tasks and recreations; this is probably due to the fact that the amount of work done per unit of time is greater under experimental conditions than in ordinary learning, that the distribution of time is more favorable, that the function is narrower, and that a higher degree of energy, attention and interest is brought to bear upon the act of learning. (3) The limit of improvement is reached only in very rare instances,—championships in golf, billiards, typewriting, shorthand and the like; most individuals remain far below their limit of efficiency even when they believe that they are doing their best. (4) Improvement is subject to external conditions (length of practice period and of recess period), to physiological conditions (effects of drugs, the effects of lack of food), to psychological conditions (interest and attitude, ease of identification of bonds to be formed or broken, ease of identification of states of affairs which satisfy or annoy, ease of application, of satisfaction or annoyance to them), and to educational conditions (selection, arrangement and presentation of subject-matter, approval, criticism and emendment of the pupil's responses).

As to permanence of improvement, it is clear that mental functions deteriorate with disuse, the rate of deterioration varying with different functions. It is impossible, however, to make any simple, comprehensive statement regarding rate or change of rate of deterioration. The amount of forgetting and the form of the curve of forgetting depend upon the nature of the bonds, the degree of learning and the competing bonds.

Most investigators have concerned themselves with abilities which represent closely organized hierarchies of habits (adding or typewriting) or narrow abilities of the formal type (checking numbers, memorizing nonsense syllables); and they have slighted such functions as have to do with information, appreciation, analysis and selection (the study of geography, history, physics and chemistry). While it is probable that what holds of improvement in the former cases will hold also in the latter cases, it is equally probable that an experimental investigation of improvement in functions which have to do with knowledge, interest, analysis and selective inferential thought would reveal important differences in details.

The various bonds are not independent of one another but are interrelated in such fashion as to form a unity of intellect, character,

and skill. Any change in one bond may influence other bonds; and the amount of change thus induced varies from cases in which the induced change is almost equal to the inducing change to cases in which the induced change is approximately zero. Numerous investigators have aimed to determine what is the amount of induced change in particular instances; but the findings are so widely at variance with one another that they can not be organized into a simple statement as to the amount of transfer. They do, however, break down the old doctrine which held that a very large percentage of the special improvement was subject to transfer. And they show, by their indefinite and confused results, how complex are the relations of facilitation and interference among man's hierarchies of habits.

Thorndike's *Psychology of Learning* is a unique and valuable contribution to the literature of this topic; and it will be welcomed by every serious student of psychological problems. In the opinion of the reviewer, its most valuable feature consists in its keenly analytic discussion of the phenomena of practice in their various aspects. The author's contribution is unique in that it makes a thoroughgoing endeavor to bring these phenomena into relation with certain general principles of an exceedingly broad and comprehensive sort, and in that it explicitly seeks to present an objective discussion of the phenomena of learning. This, too, is a valuable feature of the work; but since the author approaches the problem chiefly from this one point of view, he is led to ignore a considerable portion of the literature of the *Lernprozess*,—most of the problems which have engaged the attention of investigators in this field not being touched upon in the present book.¹ Thorndike explicitly rejects the introspective method (p. 60; p. 83); and of course no one will question his right to do so, provided his position is carried through consistently. It turns out, however, that he frequently has recourse to introspective findings, which he quotes in detail from the published literature. Moreover, two of his three fundamental laws are based directly upon subjective data; and while these subjective data are usually couched in objective or quasi-objective terms,—as when he so frequently speaks of a "satisfying (or annoying) state of affairs,"—his argument lacks cogency unless

¹ Not only does the author ignore the introspective investigations of learning, but one also finds certain very striking omissions in his references to the objective literature. For instance, Meumann appears only three times in Thorndike's index, G. E. Müller but once, and the (purely objective) work of Steffens, Jost, Witasek and others is not mentioned in the author's discussions.

these terms are taken to mean the learner's consciousness of a satisfying (or annoying) state of affairs. Indeed, the author outdoes the most extreme advocate of introspection when he appeals to the "discomforts of thwarted effort" on the part of the humble chick (p. 6). These criticisms are, of course, just the criticisms to which every objective discussion of such a topic lays itself open in the very nature of the case. Thorndike has undoubtedly been more successful in his endeavor to write an objective psychology of learning than any other writer known to the reviewer could be expected to be; and although the book can not be regarded as a complete exposition of the psychology of learning, it will prove to be invaluable to every psychologist who masters its contents.

J. W. BAIRD

CLARK UNIVERSITY

The Concept of Consciousness. E. B. HOLT. New York: Macmillan, 1914. Pp. xvi + 343.

The "Concept of Consciousness," by Professor Edwin B. Holt, of Harvard University, is a book not intended for philosophers; it is meant for those who know logic. Like the recent Lowell Lectures by Bertrand Russell, Mr. Holt's book seems to be addressed to philosophers, and seems written down to their level, yet—why pretend to delude ourselves any longer? *We have come to The Great Divide.* Books like those of Holt's and Russell's are samples of a type of contemporary philosophical thinking that can no more be understood by those ignorant of up-to-the-minute results in the *fundamentals* (not the details) of mathematical logic than Poincaré's mathematical works can be understood by those ignorant of trigonometry. Now, frankly, do our philosophers, do our *teachers of logic*, know logic? To put the question is to answer it. Where, in the name of common honesty, is one to look for a deeper sham, a more damning humbug, than the AEIO concoction that is taught as today's deductive logic? What, then, is today's deductive logic? Nay, gentle or ungentle reader, do not expect the reviewer to wax warm at this point with a "learnéd" display of Frege, Peano, and Russell. Those who know logic—and it is solely to them that we are addressing this review—will justly consider such display vulgar; those who teach logic will still continue to obvert, convert, invert and subvert.

Have you a clearcut notion of the elements of a deductive system? No. Then you are wasting your hours on Holt. Have

you painstakingly mastered the architecture of a deductive edifice? Can you unerringly recognize the deductive bricks, stones, cement, and framework? No. Then a philosophical Tower of Babel is betwixt you and Holt. Do you genuinely appreciate the difficulties and delicacies of such instruments of analysis as primitive terms, primitive propositions, relational determination, closed postulate-set, conditionally existential postulate, order-system, internal independence of postulates, relative consistence of postulate-sets, relative indefinability, relative indemonstrability, interdefinability, interdeducibility? No. Then be honest with yourself, and keep away from Holt.¹

If, on the other hand, you *can* appreciate the chasm between philosophical-metaphysical twaddle and the postulate-deductive crystallization of an avowedly limited sphere of knowledge; if you know, not merely guess, what such crystallizations have already accomplished for the sciences of algebra, geometry, and mechanics; and, above all, if you thoroughly appreciate the meaning of the problem as to the possibility or the impossibility of similar postulate-deductive determinations of branches of knowledge more complicated than mechanics—e. g., biology and psychology—then, and only then, you may profitably try the following experiment. Read through Russell's *Our Knowledge of the External World as a Field for Scientific Method in Philosophy*, then Holt's *The Concept of Consciousness*, and ask yourself whether, even after rejecting from each book a goodly amount of *detail*, there is not left, in both cases, a *residuum on which later scientific philosophizing may build?* The answer, to the reviewer, is clear. Just as all those who are competent to judge (but who do not necessarily write reviews) know that Russell's work marks an epoch in the general field of scientific philosophizing, so, the reviewer is convinced, Holt's book is refreshingly tradition-damning in a specific corner—the concept of consciousness—of this general field.

No wonder reviewers have been discreetly silent about Holt's early chapters—The Renaissance of Logic, Objections to the Program of Logic, Correspondence, and Further Implications of the Program of Logic. The chapters are so disconcertingly challenging. Pity it is that these pages, so full of suggestions to the logician,

¹ This is a propitious moment for entering a vigorous protest against the many mathematical logical crudities and misstatements in *The New Realism*. For the mathematician and the mathematical logician page reference is superfluous; for the philosopher it is futile.

should be wasted—yes, wasted—on the kind of reader the title of the book will ordinarily appeal to. And yet, *without* an understanding of these fundamental chapters, how is one to grasp the discussions that follow? But the ordinary philosopher thinks he has understood—and the damage is done. For, this same philosopher reads on; he reads about our universe at large, the substance of ideas, the substance of matter, and the neutral mosaic. Just at this point his ignorance of the structure of a postulate-deductive system prevents his enjoying a huge “metaphysical” joke; this ignorance inevitably prevents his noting that every time Holt uses the term “neutral entity” Holt is laughing in his sleeve (mathematical logicians will understand why: he is gratuitously *labelling* his primitive terms). With such misplaced solemnity on the part of our hypothetical philosopher, the bewilderment that befalls his endeavor to understand the crucial chapter, entitled “The Concept of Consciousness,” is painful; and he is consequently doomed to an utter misinterpretation of the contents of such innocently-clept chapters as the empirical properties of consciousness, sensation and perception in the conscious cross-section, memory, imagination and thought. At the end of the next chapter, Error, he will shut up the book with a bang, and will leave unread the vital chapters on volition and on the emancipation of physiology from philosophy.

All of which is merely a roundabout way of saying that while Holt’s book *should* appeal to the “metaphysician,” to the “epistemologist,” to the “philosophy of science-ist,” to the psychologist, and to the logician, it *does* actually make its deepest appeal to the—if we may say so—applied mathematical logician. And why? Because the central theme of the book is *an attempt to do for consciousness what a postulate-deductive analysis of dynamics does for force*. And if, in this attempt, Holt has explained away consciousness in the sense in which a deductive determination of a certain type of algebra explains away imaginary number, in the sense in which *any* deductive analysis of *any* system explains away the “nature” of the primitive terms—then all we can say is, “Well and nobly done.” But listen to some petulant reviewer: “Holt does not explain consciousness; he explains it away.” Why bother to answer such a critic? He has clearly failed to grasp the problem. For, verily, the current philosopher—*i. e.*, “he who runs”—may read, but he shall not understand; no, not even if he is a blatant critic.

HENRY M. SHEFFER

UNIVERSITY OF MISSOURI

Psychology and Social Sanity. H. MÜNSTERBERG. New York:
Doubleday, Page, 1914. Pp. xii + 320.

The volume under consideration is frankly designed for popular consumption. It consists of ten essays. The first on "Sex Education" maintains that the movement thus designated is mistaken, inasmuch as the psychological effect of such instruction is more harmful than silence. In the second, on "Socialism," the outcome of this doctrine is estimated with reference to its economic values and its promise of increased happiness for mankind. Both are dismissed as illusory. In "The Intellectual Underworld" the author draws upon his miscellaneous correspondence with cranks and confused minds to indicate the widespread tendency even among normal persons to devise untenable theories for lack of ability to base their reasoning upon sound assumptions. The essay on "Thought Transference" deals with the case of Beulah Miller. The author's tests upon this little girl tended to show that her marvelous powers are attributable to no occult source, but are dependent upon the interpretation of subconsciously received signs given her unintentionally by her mother and sister.

In "The Mind of the Juryman" an ingenious class experiment is described by means of which the author was able to test the effect of free discussion upon bodies of men and women, respectively. Large gray cards were prepared upon which were pasted dots of different size varying in number from 92 to 108. The class was asked to compare any two cards and judge which had the more dots. After the judgment was registered a free discussion ensued. Three votes were taken with intervening periods of discussion. The results for the class of eighteen men indicated 52 per cent. of correct estimates on the first ballot, and 78 per cent. on the last. With the class of women 45 per cent. of right judgments was registered on the first, and the same percentage on the final ballot. Forty per cent. of all the judgments of men changed in the course of the experiment, but only 19 per cent. of the judgments of women. A supplementary experiment upon a class of 460 students indicated that a show of hands without discussion had but an inappreciable influence upon the estimates. From this it is concluded that the jury system is of positive value in reaching correct judgments, provided the jurors are men. Women, however, are unsuited to this system.

The sixth essay, "Efficiency on the Farm," advocates the establishment of regular psychological laboratories at government experiment stations to investigate the economic use of farm tools,

and such activities as milking, butter making, feeding cattle and picking fruit. "Social Sins in Advertising" is chiefly directed toward the current practice of mixing advertisements with the regular reading matter of magazines. A class test was performed in which forty-seven students were offered for inspection a twenty-four page portfolio, sixteen pages of which distributed funny pictures among advertisements, while eight pages consisted solely of advertisements. Upon recall it was found that the advertisements appearing on pages free of irrelevant matter were better retained than those which appeared beside funny pictures. The conclusion was thus reached that the practice in question is unwarranted, both from the point of view of the publisher and of the advertiser.

In "The Mind of the Investor" the tendency among Americans to make unwise investments is subjected to analysis, and the conclusion drawn that this tendency is chiefly based upon the lack of respect for expert opinion which prevails among us. This, in turn, has its roots in the lack of mental discipline afforded by our educational practice. "Society and the Dance" draws a parallel of the harmful and beneficial effects of the dance craze which at present seems to be upon us. In the final essay on "Naïve Psychology" a number of popular sayings, proverbs, maxims, familiar quotations and the like, both from antiquity and from modern sources, are reviewed with reference to their psychological content. The conclusion is then reached that while metaphor and comparison, practical advice and warning, praise and malice abound, scarce one contains a truly psychological observation.

Psychologists will read Professor Münsterberg's volume with interest. His well-known advocacy of applied psychology has led him into many fields hitherto neglected. One cannot but regret, however, that such tests as those from which he draws his conclusions upon the mind of the juryman—especially the negative effect of argument upon the female mind—as well as the one concerning the distribution of advertisements with other reading matter, were not extended beyond the confines of a class experiment. The class experiment, as described, is a rather slender basis for such important and wide-reaching conclusions. Furthermore, some of the positions taken, as in the discussion of sex education and the possibility of thought transference, are sufficiently personal to cast doubt upon the propriety of offering them as opinions of the psychologist. They were perhaps better described as views of a psychologist.

R. M. OGDEN

UNIVERSITY OF KANSAS

Outlines for Experimental Psychology. H. L. HOLLINGWORTH.
New York: Seiler, 1914. Pp. 100.

The uses of experimental psychology seem to fall naturally into two groups, the training group and the informational group. There are those to whom all instruction in experimental psychology worthy the name falls in the former group. There must be laborious drill with infinite attention to infinitesimal details, in order adequately to prepare a prospective research investigator. This method undoubtedly has its value as well as adherents. It seems to fail, in many cases, to elicit an enthusiasm for scientific ideals. A qualitative analysis and a quantitative measurement of specific mental contents is a necessary procedure for the scientist who has already formed an ideal of investigation. Those who as yet lack the problems toward which such methods are directed show a tendency to miss the bearing of the refined methods of advanced work. And the extension of the elective system in our colleges and universities has brought many undergraduates into such a course.

On the other hand, there are those to whom a wider familiarity with experimental methods of psychologists in their work in various fields seems desirable. Students who gain an intellectual interest in life's problems through the elementary course are entitled to a wider opportunity for selection of fields of work, and there are points to the argument that such a student should not be cut off entirely from the opportunity of informing himself regarding the methods which psychologists have devised for investigating these problems. To supply such a need, a collection of experiments has been prepared by Dr. Hollingsworth under the above title, and it seems to the reviewer excellent for this purpose.

The experiments are grouped under five of the seven topical divisions of the outline. (1) The Introduction offers references and discussions in the history and problems of experimental psychology; laboratory methods and sources of error; uniformities and differences of human nature. (2) "Externally Observable Behavior" deals with the methods of studying work, learning, efficiency and skill, fatigue, correlation of abilities, and reaction times. The references at the close of the sections are to entirely familiar psychological literature. (3) "Semi-observable Behavior" gives methods and problems of attention, and (4) "Expressive Behavior" those of the feelings and emotions. (5) "Semi-introspective Experience" is devoted to experiments on perception, association, memory, forgetting, rhythm, etc. (6) The section on "Purely Introspective

"Experience" gives some of the simpler experiments on sensory phenomena, imagery, affective processes and judgment. The final section (7) on "Psychometric Methods" includes a summary in which special problems are suggested for more detailed study.

The book is the outline of a course to cover one year, and apparently is not intended as a text or laboratory guide. It will require considerable supplementing by the instructor from sources not mentioned in the book. It aims to bring to the elementary student many problems and many methods which have been collected in no other single volume. The selection of experiments is good but at points the instructions will perhaps be found to assume more information than the average instructor in psychology now possesses. An indication of norms which have been obtained from studies in behavior would be a valuable addition to those topics. And if the intention is to lead the student further into psychology, the section of "Purely Introspective Experience" could advantageously be extended without encroaching on the proper materials of a drill course. The well-equipped laboratory will contain instruments for some important experiments which are not included in the outline. But without these, the book has merits which will appeal to a wide range of laboratory men.

A. H. SUTHERLAND

YALE UNIVERSITY

Advertising : Its Principles, Practice, and Technique. D. STARCH.
Chicago: Scott, Foresman, 1914. Pp. 281.

As appears from the preface, this book is intended to serve "as a first text-book for students and as an introductory handbook for business men." The principles of advertising are illustrated by three different groups of facts. In the first place, the changes in policy which have come in the course of the great development of advertising in the last fifty years are taken up. These changes show what methods are proving successful and what methods are being supplanted. In the second place, the results obtained by firms which have conducted systematic investigations of the effectiveness of their advertising are considered in detail. The experience of business men with advertisements actually in use is given greatest prominence in the book. And in the third place, facts brought out by laboratory experiments are introduced. The relation between the laboratory experiment and the actual effect of the advertisement in operation is always clearly shown. Not much new experimentation is reported.

The book is a good deal more than a consideration of the psychological aspects of advertising. A number of problems are taken up which do not fall immediately within the sphere of psychology. Thus, four chapters are devoted to a consideration of the different kinds of advertising mediums. But the function of an advertisement is "to attract attention, to stimulate interest, and to secure a response," and the psychological principles which underlie the construction of the advertisement itself, are taken up in detail.

A large number of illustrations are used, these being nearly all reproductions of advertisements which have actually been used. These well-chosen examples illustrate in the clearest possible way the points discussed in the text. The treatment throughout is systematic and clear. Psychological technicalities are avoided, so that the whole can be easily understood by the lay reader. In the field of advertising, the author says, "scarcely more than a beginning has been made." Those who believe in the scientific treatment of the subject will welcome his book as an excellent exposition of the spirit of this beginning.

JOHN T. METCALF

PRINCETON UNIVERSITY

BOOKS RECEIVED

- BRAUNSHAUSEN, N. *Einführung in die experimentelle Psychologie.* Leipzig: Teubner, 1915. Pp. III. M. 1.25.
- REHMKE, J. *Die Seele des Menschen.* 4 Aufl. Leipzig: Teubner, 1913. Pp. 109. M. 1.25.
- FÖRSTER-NIETZSCHE, E. *The Life of Nietzsche.* (Trans. by P. V. Cohn.) Vol. 2. New York: Sturgis and Walton, 1915. Pp. xv + 415. \$4.
- LE ROY, E. *The New Philosophy of Henri Bergson.* (Trans. by V. Benson.) New York: Holt, 1913. Pp. xi + 235.
- KELLEY, T. L. *Educational Guidance.* New York: Teachers College, 1914. Pp. vi + 116. \$2.
- ELLIOTT, C. H. *Variations in the Achievements of Pupils.* New York: Teachers College, 1914. Pp. iv + 114. \$1.25.
- ZIEHEN, T. *Die Grundlagen der Psychologie.* 2 vols. Leipzig: Teubner, 1915. Pp. vi + 259; vi + 304. M. 10.
- BYINGTON, C. *A Dictionary of the Choctaw Language.* (Ed. by J. R. Swanton & H. S. Halbert.) Washington: Govt. Printing Off., 1915. Pp. xi + 611.
- CARUS, P. *Goethe, with Special Consideration of his Philosophy.* Chicago: Open Court, 1915. Pp. xi + 357. \$3.
- CRILE, G. W. *The Origin and Nature of the Emotions, and Miscellaneous Papers.* (Ed. by A. F. Rowland.) Phila.: Saunders, 1915. Pp. viii + 240. \$3.
- PARSONS, J. H. *An Introduction to the Study of Colour Vision.* New York: Putnams, 1915. Pp. viii + 308. \$3.75.
- JOHNSTON, G. A. *Scottish Philosophy of Common Sense.* Chicago: Open Court, 1915. Pp. viii + 267. \$1.25.

NOTES AND NEWS

RICHARD M. ELLIOTT, Ph.D., at present instructor in psychology in Harvard College, has been appointed instructor in psychology in Yale University.

DR. H. T. MOORE, of Simmons College, has been appointed assistant professor of psychology in Dartmouth College. A separate building is to be made available for the departments of psychology and education, and there will be ample quarters for psychological teaching and research.

A SOCIETY for experimental phonetics was recently organized in Italy, and at the first meeting, which was held in Rome, papers were read by Ferrari and Bilancioni on the fatigue of the larynx and by Granedigo on phonation and respiration after tracheotomy.

THE San Francisco meeting of the American Psychological Association with Section H of the A. A. A. S. will be held in the psychological laboratory of the University of California (August 2, 3, and 5) and in the psychological laboratory of Stanford University (August 4). The preliminary program, based on the announcements already received of papers, contains the following topics for the sessions: Mental Tests and Their Pedagogical Significance; Reports of Experimental Investigations in General Psychology; Psychical Research; Psychology in Relation to Medicine; and Animal Psychology. Titles and abstracts of papers to be presented should be in the hands of the chairman of the committee, Professor Lillien J. Martin, Stanford University, before July 15.

THE former combined department of philosophy, psychology, and education in the Johns Hopkins University has been divided into three independent departments. The psychology heretofore included in the course in philosophy prescribed to all undergraduates will be omitted after next year, an elective introductory course being offered instead.

THE new University of Frankfurt has grouped psychology with the natural sciences in the faculty of science (see the BULLETIN for March, page 127). A recent action by the University of Missouri goes in the same direction. Students who have done no biological

work in high school and who therefore have to take in the first or second college year five hours of biological science may fulfil this requirement by taking five hours of psychology. To this extent the University of Missouri recognizes psychology as a biological science.

At George Washington University practical work with the Binet tests was started during the past year in the psychological laboratory. This work will be extended next year, the plan being to enlarge it into a psychological clinic.

THE degree of doctor of medicine, *honoris causa*, has been conferred by George Washington University and that of doctor of laws by Waynesburg College upon Shepherd Ivory Franz.

THE committee appointed by the American Association of University Professors to investigate conditions at the University of Utah has issued a preliminary report which appears in the *Nation* for June 3. Two members of the American Psychological Association were among those who resigned from the University faculty. The American Psychological Association is represented on the committee by Professor H. C. Warren of Princeton.

PROFESSOR ELLSWORTH E. FARIS, who during the present year has filled a temporary vacancy in the University of Chicago, has been appointed associate professor of psychology in the University of Iowa, and will specialize in social psychology.

THE following items have been taken from the press:

DR. JOSEPH PETERSON, who recently resigned his professorship in the University of Utah, has been appointed professorial lecturer in the University of Minnesota.

DR. ERNEST MEUMANN, professor of psychology at Hamburg, has died at the age of 53 years.

THE medical journals have contained the announcements of the deaths of the following: Sir Thomas S. Clouston, the British psychiatrist; Sir William R. Gowers, who is well known for his text-books on diseases of the nervous system; and Professor J. Stilling, of Strassburg, who had published important contributions on color vision.

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THE

PSYCHOLOGICAL BULLETIN

GENERAL REVIEWS AND SUMMARIES

GENERAL PSYCHOPATHOLOGY

BY E. E. SOUTHARD

Psychopathic Department, Boston State Hospital

The reviews and summaries of this number of the BULLETIN are intended to deal with general or theoretical psychopathology as distinguished from a special psychopathology of text-books on psychiatry. The scope of general or theoretical psychopathology can be defined, for example, by considering the content of that portion of German text-books of psychiatry termed "General Psychiatry"; and especially by that portion of general psychiatry termed the "phenomena of insanity" in Kraepelin's well known text-book (eighth and latest edition, 1 Band, Leipzig: 1909; Kraepelin's section on the phenomena of insanity occupies pp. 210-437). The latest edition of Ziehen's *Text-book of Psychiatry* (Leipzig: 1911) deals with similar topics under the heading of "General Psychopathology," subhead, "General Symptomatology" (pp. 7-224). The second and last edition of the text-book of the late Carl Wernicke (Leipzig: 1906) deals with general considerations from a peculiar angle, in what Wernicke terms a "Psychophysiological Introduction" (pp. 1-78).

Since the publication of these works, the most important systematic work in psychiatry is Aschaffenburg's *Handbuch* (1), which is one of majestic proportions, being issued at different times as the numerous authors completed their analyses. Most of this *Handbuch* fails to be of general psychological or even psychopathological interest. The following are some of the more important contributions.

Kirchhoff presents (25) in the fourth section of the general part an account, chiefly from the German point of view, of the history of psychiatry, with the main headings of the literature, including the names of Haeser, Hirsch, Pagel, Laehr. The names of psychologists are conspicuous by their absence, although the work of Max Dessoir, *Geschichte der neueren deutschen Psychologie*, is quoted. The importance of Paracelsus in the development of modern psychiatry is emphasized (compare Proksch, *Paracelsus als medizinischer Schriftsteller*). Kirchhoff calls attention to the commanding importance of Griesinger in the development of the modern psychiatric clinic, and to the breadth of Griesinger's point of view in pointing out, not only the path of research in pathological anatomy, and the path of research in clinical neurology, but also the value of psychology. Griesinger's *Lehrbuch* is stated by Kirchhoff to be founded on Reil's doctrine of the disturbances of the *Gemeingefühl*, and to unite the data of the Herbartian psychology with his own personal work with clinical and anatomical methods. The history of psychiatry has reached a point in which the stadia or *phases* of disease are to be distinguished from the *forms* of disease. At the moment, anatomical research appears to be pushed somewhat to the background by clinical methods. The modern insistence upon pathography and the interest in many works on morbid character which the general public has shown are also features of the present situation.

Gross' monograph (20) in the *Handbuch*, on the general therapy of the psychoses, contains (pp. 105-131) some account of psychotherapy. The methods of psychotherapy are divided into the direct and indirect methods in the sense of v. Schrenck-Notzing. The direct method is leveled at intellect, feelings, and will. The physician seeks directly, by means of conversation or otherwise, to influence the disorders in these several fields. The methods of hypnosis, psychoanalysis, persuasion (in the sense of Dejerine and Dubois) are considered as direct methods. Mohr (30), in Lewandowsky's *Handbuch der Neurologie*, has approved hypnotic methods especially for phobias, imperative ideas, and imperative acts. As to psychoanalysis, the value of this method in neurasthenia has been acclaimed in many quarters and attacked as violently in others. Anton and von Strümpell have gone so far as to term psychoanalysis an epidemic. Aschaffenburg believes the method is painful and often injurious to patients without securing results superior to those of other methods. Such statements as these

latter are found scattered through the German literature except in the Freudian group.

Under indirect methods, Gross deals with religion and philosophy, as well as occupational therapy and the various pleasures of living. Dejerine is quoted as believing that only an indeterminist can be a good psychotherapist. Occupational therapy is traced back to Heinroth. Note is made of the method of teaching groups of chronic patients for the purposes of successful occupational therapy. Patients are to be grouped not merely clinically and for custodial purposes, but also for pedagogical purposes. It would seem that this tendency would have a considerable scope if directed by psychologists and others interested in vocational developments.

Undoubtedly the most important section in the Aschaffenburg *Handbuch* from the standpoint of originality is the volume of Bleuler on dementia praecox (7), which he denominates the group of schizophrenias. This work should unquestionably be read by every worker interested in psychopathology, and the novel concepts, or novel definitions of older concepts, therein described under the names of *schizophrenia*, *ambivalence*, *ambitendency*, *autism*, seem to be taking hold of the literature. (Kraepelin, for example, has re-labeled in the new edition a photographic group of dementia praecox patients, "schizophrenic.") A brief account of his ideas has been presented in English by Bleuler in his address at the opening of the Henry Phipps Psychiatric Clinic in Baltimore (8). Bleuler regards his concepts as to some extent the result of a conjugation of the work of Kraepelin with that of Freud. The result will be generally regarded as far more Freudian than Kraepelinian.

The tenth section of Bleuler's work deals with the theory of the symptoms of the schizophrenic group (pp. 284-371). The schizophrenic patient keeps reality from injuring him by not allowing it to reach him. This is the process of autism; the patient ignores the world, splits it off, and escapes it in his thought. Autism for these patients has the same significance as do the walls of the cloister to the monk or the hermitage to the saint. The difference between sick and well is but quantitative. This recourse, however, is not permanently successful. In most institutional cases, the patient's wishes become fulfilled, and obstacles are taken as overcome. Of course this effect is doomed to failure unless reality is totally split off or wholly transformed. The so-called "dazed state" (*Dämmerzustand*) is an example of such a total transformation of reality, unfortunately not a lasting one. The patients are

here reacting in much the same way as do the day dreamer and the poet. If the patient does not succeed in transforming reality quite to his wishes, then it is perhaps so far transformed in fancy that the obstacles appear actual and at least subject to overcoming (delusions of persecution which transform obstacles into the machinations of other men). Not infrequently, that part of the world which lies nearest to hand is transformed, but of course not completely (in that case there would be no manifest disease), but in such ways as the socalled Ganser syndrome and hypochondriacal conditions show. The total drift of these transformations is toward an affective eudæmonism, despite the fact that this is often clouded by difficulties in thinking and by the various characteristic accessory symptoms of dementia præcox.

Bleuler regards his account as a concrete advance upon such older accounts as are in existence; for example, to regard this disease as a disorder of the highest mental function (Gross), or a disorder of apperception in the sense of Wundt (Weygandt), is to no purpose. Other authors have regarded the disease as essentially disorder of attention (Tschisch), or of the synthesis of the ego (Janet). Expressions such as "ideational weakness" (Sérieux), or "diminution of voluntary and intellectual activity," or "incapacity of mental effort," or "lowering of the mental level," are empty phrases.

The mental functions fundamentally altered in schizophrenic patients are association, affectivity, and will. Associations lose their coherence. The disease interrupts the thousand threads that lead our thoughts, and interrupts them irregularly; now a few, now many, and again the majority. The outcome of a thinking process becomes accordingly unusual and often logically fallacious; associations strike into new paths; two ideas that accidentally cohere become fused into a thought; sound associations achieve an unusual significance; two or more ideas are condensed into one. The characteristic stereotyped tendency causes the thought process to stick hanging to one idea, or causes the patient continually to return to the same idea. All degrees of ideational paucity ensue, down to monoideism. The disorder is not only one of cohesion of simultaneous ideas and partial ideas, but also a disorder in the succession of associations. There may be a pathologically augmented influx of thoughts on the one hand, and on the other a characteristic blocking (*Sperrung*). This concept of *Sperrung* is attributed by Bleuler to Kraepelin. It is to be fundamentally distinguished

from *Hemmung*, a term ordinarily translated into English by the term retardation. Retarded thought and action proceed slowly and with difficulty, as if the "psychokym were moving viscously in a system of tubes," but a system of tubes everywhere permeable. In the case of *Sperrung*, an easily mobile fluid is suddenly blocked as if a cock were shut off.

The disorder of affectivity in schizophrenia, the so-called emotional deterioration of the older books, is characterized by indifference. Above all, the unity of emotional expression is lost. There is an abnormal lability of emotions. Patients are emotionally excited if they are forced to think certain ideas such as moved them either before or at the beginning of their disease (the so-called complexes). In various ways it may be shown that the mind has not fundamentally lost its capacity to exhibit emotion. Very striking in these cases is the so-called parathymia (as, sad news met with laughter, etc.).

Ambivalence may be found in the three major divisions of mental function. Thus, there may be an affective ambivalence, when ideas are accompanied at the same time by pleasant and unpleasant ideas. There is a special ambivalence of the will, which may be termed ambitendency. Intellectual ambivalence expresses itself in numerous contradictory statements and acts, many of which have a strongly metaphysical tinge.

So much will suffice to indicate the novelties of the point of view of Bleuler. The general situation in psychopathology today seems to exhibit a fresh split between the Freudian and what may be termed the regular or conservative forces. This ingenious attempt at compromise made by the eminent psychiatrist of Zürich will go far to mend the break. Already the term schizophrenia seems to have taken a firm root in many camps; upon the analogy of schizophrenia, Kraepelin, for example, demonstrates a special form of dementia *præcox* characterized by peculiar speech disorder, *schizophasia* (26).

Psychologists must be particularly interested in the section of Aschaffenburg's *Handbuch* dealing with psychology (23). This is contributed by Isserlin, of Munich. This monograph contains 92 pages, and is not accompanied by the elaborate bibliography usually found in German works. Isserlin undertakes to say that psychiatry cannot get on with a mere knowledge of brain mechanisms. The mental series themselves have their own peculiar right to consideration, and general psychopathology is a psychological

science. The fundamental questions and concepts at the base of psychopathology are taken up, and one notes a consideration of the points of view of Külpe, Lipps, Wundt, and Wernicke. The unconscious is taken to be a brain disposition or sum of dispositions. Psychophysical parallelism is a working hypothesis uniting brain physiology with empirical psychology. The brain physiologizing of Wernicke is conceived as highly disadvantageous.

The section on methods deals, among other things, with the work on memory of G. E. Müller and a variety of experimental methods. The work of W. Stern on the psychology of individual differences is thought to possess important aspects for psychiatry. Note is made of the method described by Kraepelin of artificial mental disorder, produced, for example, by drugs, as an important auxiliary method.

The section on "Facts" deals with Wundtian points of view, but also quotes from Stumpf, Lipps, and Ach. Isserlin feels that one's fundamental viewpoint as to psychology has the greatest importance in practical questions of classification, calling attention to the theoretical differences between the motility psychosis of Wernicke and the clinical picture of catatonia as described by Kraepelin.

Special sections follow on ideation and reproduction of ideas (Wundt, Wirth), and on consciousness and attention (Külpe, Dürr).

The concept of the ego as a conglomerate is not favored by Isserlin, who would rather agree with Wundt that the combining factor is emotion, and not some process of mere association.

Some consideration is given under the heading "Thought" to the work of Marbe, and considerable space is given to Wundtian conceptions. The work of Liepmann, *Ueber Ideenflucht*, is considered of importance, with its development of the so-called super-idea (*Obervorstellung*). The mechanism here appears to be one of attention. The treatment of emotional life is again Wundtian. Some criticism is leveled at the James-Lange theory. Sections follow on the will and the individuality. No consideration is given to the Freudian contentions.

The editor of the *Handbuch*, Aschaffenburg, of Cologne, has himself contributed a section on the classification of psychoses (3). He divides the psychoses into three great groups: endogenous, exogenous, and organic. The endogenous psychoses are those that "develop out of the personality of the individual." The

externals of life dictate, not the character of the disease, but only its manner, extent, and intensity. Endogenous psychoses comprise the psychasthenic conditions (neurasthenia, hysteria, pathological affect reactions, traumatic neuroses), constitutionally psychopathic conditions (abnormal characters, obsessive psychoses, and constitutional disorder of emotions), and the constitutional psychoses, namely, manic depressive insanity and paranoia.

The exogenous psychoses are the psychoses of intoxication and exhaustion, cretinism and myxedema, alcoholic psychoses, and drug psychoses. Organic diseases consist of the syphilitic group, a brain disease group, dementia praecox, epilepsy, and feeble-mindedness. Emphasis is laid here again upon the relatively modern distinction between the phenomena of disease as they occur in some groups and the genuine disease types.

In the same volume with Aschaffenburg's work on classification, H. Vogt, of Wiesbaden, deals with epilepsy and describes psychic features in pages 91 to 116, including several important references (41).

Aschaffenburg (2) deals with general symptomatology of the psychoses, with a somewhat novel order of consideration. After dealing briefly with the physical signs, he starts the discussion with the emotional life, passing therefrom to perception, attention, and the like, thence to consciousness, memory, ideation, intelligence and judgment, and the will. His consideration of the emotional life and its disorders includes, not merely an account of the simple feelings and affects, but conceptions of hypersensitivity, excitability and irritability, affective anesthesia, moral anesthesia, autism. The *überwertige Ideen* are also considered under the heading of "Emotions." The intelligence tests are taken up under "Disorders of intelligence and judgment." Sexual perversions are classified under "Disorders of the will."

Weygandt (45) deals with idiocy and imbecility, and has presented a larger and more elaborate classification of feeble-mindedness than has hitherto been made, calling attention to numerous groups of glandular origin.

Probably next in general interest to Bleuler's volume on the schizophrenic group is Stransky's monograph on manic-depressive insanity in Aschaffenburg's *Handbuch*. This is an elaborate account in 272 pages with charts (39). According to this author, manic-depressive insanity might be termed a *Stimmungssirresein*. It is the anomaly of emotion which stands out in the symptoms,

and these affective anomalies are not essentially different from those of normal moods. In the fifteenth section on nosology, etiology, and pathogenesis, appear certain considerations of general psychological interest. Stransky regards manic-depressive insanity as representing a certain type of reaction, a disposition to certain alterations of emotional state occurring in phases either of endogenous origin or far exceeding in intensity and duration any exogenous determinants that may happen to be present. Perhaps most suggestive is the comparison of the phenomena of the disease with those of the incomplete forms of Graves' disease. Stransky believes that the vasomotor system and the thymopsyche are possibly the *locus minoris resistentiae* for the factors, whatever they are, which produce manic-depressive psychosis. In the general sections on depressive and maniacal states respectively, mention is made of certain data of psychological interest, largely from the older literature. Reference is made to the work of Franz and Hamilton on retardation, as well as to that of Liepmann, Isserlin, and others.

Ziehen has published a tenth and revised edition of his book, *Leitfaden der Physiologischen Psychologie* (49). His standpoint of opposition to the Wundtian doctrine of apperception and his trend in the direction of the British association-psychology are well known. The fourteenth chapter deals in part with morbid feeling and thinking, and is supplied with a small but well-chosen bibliography. The subject matters dealt with are chiefly synesthesia, hallucinations, and illusions. The importance of work on the psychology of feeble-mindedness is insisted upon. See also second edition of Ziehen's *Geisteskrankheiten des Kindesalter* (47). As to hypnosis, Ziehen states that a faint light has been thrown upon the condition by Weber's *Der Einfluss psychischer Vorgänge auf den Körper*. Ziehen devotes considerable attention to pain, calling attention to the work of Rivers and Head, as well as to the work of Head and Thompson, and Head and Holmes. On page 261, Ziehen calls attention to Mark Twain's picture of what Wernicke has termed *Überwertigkeit* in "Punch, Brothers, Punch."

During 1914, the stately *Handbuch der Neurologie* (28), edited by Lewandowsky, of Berlin, came to a conclusion with its fifth volume. There is at present no such book by many authors in any other language. Although most of the work has little direct interest for psychologists, attention may be called to a number of sections. The first volume, published in 1910, contains, for ex-

ample, a brief chapter on the physiological principles of muscle mechanics, by R. du Bois-Reymond (10), with a description of certain models of muscle and joint action; a chapter on the physiological phenomena attending mental processes, by E. Weber (44), containing a brief summary of the findings in Weber's book on the same topic published in 1910. The second part of the first volume has chapters by Henschen on central visual disturbances (22), and by Bárány on nervous disorders of the cochlear and vestibular apparatus (4); and a chapter on psychotherapy, 53 pages long, by Mohr (30), taking up systematically and somewhat fully the methods of hypnosis, waking suggestion, auto-suggestion, and other methods termed *Ablenkung, Überrumplung und Einschüchterung*, a method by painful impressions, methods of education and persuasion, *Willenstherapie*, the therapy of occupation, constitutional treatment, psychoanalysis (here very briefly treated). The second volume, 1911, contains little of interest to the psychologist. The third volume, 1912, contains an interesting brief summary of the theory of seasickness (5), by Bárány (10 pages). The fourth volume, 1913, contains a number of systematic articles on glandular disease and its relation to neurology, among which perhaps most interesting is one by Schickele (37), of Strassburg, on the relation of the neurology of the menopause to internal secretions. The fifth and last volume, 1914, contains numerous articles upon functional diseases, including a good systematic account of occupation neuroses by Mohr (31), a monograph on psychopathies by Wilmanns (46). Wilmanns defines the psychopath in a manner following Möbius' *Ueber Entartung*, as a morbid variation of the norm, namely, an anomaly which reaches a certain intensity, psychopathic types of imbeciles, victims of moral insanity, of *Haltlosen* (Kraepelin), the hysterics, the victims of pseudologia phantastica, epileptoid degenerates, poromanics, dipsomanics, victims of mental change at menstruation, cyclothymics, victims of constitutional lability of emotions, constitutional depressions, constitutional excitements, neurasthenics, hypochondriacs, obsessives. The article on hysteria is an elaborate one by the editor, Lewandowsky, pages 644 to 831, with over 400 chiefly modern references. The article contains an extensive discussion of the Freudian methods.

Gregor, well known for his older work on psychopathology, presents a small *Lehrbuch der psychiatrischen Diagnostik*, in 240 pages, with a removable appendix of 15 pages, suitable for practical ward work (19). The discussions in this small book are particu-

larly clear and may be recommended for a brief survey of psychiatry at the moment. The predominant trend is perhaps that of Kraepelin, but it may be noted that Ziehen's interesting distinction of properties of the attention, namely, vigilance (alertness), and tenacity, is employed.

Attention may be called to the thoroughness of the extensive and very even reviewing of psychological and psychopathological work to be found in the *Referate* of the *Zeitschrift für Neurologie und Psychiatrie*. The volume for 1914 contains a report on new findings in experimental psychology and pathology (memory, association, *Aussage*), 60 pages, with 120 references, chiefly since 1908. Modern work on memory is founded on the classical work of Ebbinghaus, 1885, and Müller and Schumann, 1894, and Müller and Pilzecker, 1900, Meumann's more recent work on *Oekonomie und Technik des Gedächtnisses*, and Offner: *Das Gedächtnis*. Recent work of Bechterew in close relation to that of Pawlow has a bearing on modern work. Gregor has himself undertaken to apply the Ebbinghaus method to psychiatry. His results in paresis are given. Several pieces of work have been done with Korsakoff's psychosis, as well as with feeble-mindedness and dementia praecox. The work on associations, beginning with the presentation by Sommer in his *Lehrbuch*, followed by the extensive work of Aschaffenburg in the early volumes of Kraepelin's *Psychologische Arbeiten*, has been pursued both on academic lines and after the manner of Jung. Considerable work has been done upon associations in epilepsy as well as in dementia praecox. Systematic work on *Aussage*, for which the basis was laid by various authors, but which was most systematically carried out by Stern, has been continued by Lipmann, Chon and Gent, Aal, Lem, Heindl, and others.

Göring (18) presents a brief abstract relating to sexual crimes by mental patients, with a bibliography of 257 references, in which the names of Aschaffenburg, Boas, Garnier, Krafteburg, Leppmann, Näcke, stand out. The most extensive consideration is given to sexual crimes with children, to exhibitionism, and to the effects of alcohol.

Voss, in an article on association tests in children (42), based on a closely studied case of word blindness, believes that simple association experiments are of great service with children. Voss uses a scheme of 20 words (*Zsch. f. d. ges. Neur. u. Psych.*, Orig. 1914, 26, 340).

American readers must be particularly interested in American products in psychopathology. The *Proceedings of the American Medico-Psychological Association at its seventieth annual meeting*, held in Baltimore, Maryland, 1914, contain several papers of interest. Barker, in the annual address (6), presented the relations of internal medicine to psychiatry in a finished manner, characteristic of this writer, making brief reference to the points of view of Kraepelin, Wernicke, Ziehen, Lugano, Jaspers, Hoch, Meyer, Knight Dunlap, Loeb, Watson, Bechterew, and others. E. Stanley Abbot attempts to answer the old question, "What is paranoia?", dealing with paranoia, however, as an entity rather than as a symptom in the sense of Ziehen. C. W. Burr (12) presents a criticism of psychoanalysis, which he states at the outset is not sympathetic. Dercum follows with a similar statement, whereupon W. A. White and Hoch bring in statements in rebuttal, which give Dr. Burr "not the slightest reason to change or alter his viewpoint." Meyer (29) gives an account of the organization of the work of the Henry Phipps Psychiatric Clinic, and Macfie Campbell (14) presents an interesting discussion of dispensary work, with its possibilities of analysis along the line of correction of mental mal-adjustments (in the sense of Meyer). Several other papers appear in the *Proceedings* illustrating psychopathological interest.

A translation of the work of O. Rank, of Vienna, entitled, "*Myth of the birth of the hero*" (a psychological interpretation of mythology) has appeared,—translated by Dr. F. Robbins and Dr. Smith Ely Jelliffe (34),—and does not require review here; nor does Brill's translation of Freud's *Psychopathology of every day life*, also published in New York in 1914. C. B. Burr, of Michigan, has published a *Handbook of Psychology and Mental Disease* (11), being a fourth edition,—the first published in 1898. New material in this work is comprised in the second part, entitled, *Symbolism and Insanity*. This chapter appears to have been inspired by the work of Freud.

Numbers of the *Psychological Clinic* contain a number of papers upon the Binet tests. In one of these Thorndike (40) discusses the significance of the Binet mental ages, asserting that there is doubt as to the significance of the Binet mental ages on account of a superior selection of children of certain ages employed in the tables presented by most workers. Other papers deal with speech defects and with delinquency.

Three somewhat striking works have been published in America

during 1914: the work of Prince, *The Unconscious*; that of Goddard on *Feeble-mindedness*; and that of Healy, *The Individual Delinquent*.¹ The title of Prince's book is, *The Unconscious; Fundamentals of Human Personality Normal and Abnormal* (33). The material is treated with the well-known independence of the author, who however quotes freely from Cannon, Freud, Janet, McDougall, and Pawlow. Most original from the standpoint of nomenclature are the concepts of the *co-conscious* and the so-called *neurograms*. States of co-consciousness are co-existing dissociated states of consciousness, of which the personal consciousness is not aware. Such co-conscious ideas are conscious states "not in the focus of attention but in the fringe of the content of consciousness." But co-conscious ideas are also "pathologically split off and independently acting ideas or systems of ideas such as occur in hysteria, reaching their apogee in co-conscious personalities and in automatic writings."

Prince proposes to use the term *subconscious* in a generic sense to include (a) co-conscious ideas or processes, (b) unconscious neurograms, and (c) unconscious processes. The unconscious for Prince accordingly becomes two sorts of thing: first, what he terms "conserved neurograms, or neural dispositions," second, "active functioning neurograms or neural processes."

The fifth lecture is devoted to neurograms. Prince states that it is possible that through "chemical changes left by experience in neurones, these neurones may get sensitive so as to react again to a second stimulus." Prince provides an analogy with anaphylaxis, and also quotes Brailsford Robertson's theory of memory as possessing the nature of autocatalysis. Rignano's hypothesis of nerve cells as accumulators analogous to electric accumulators, or storage batteries, is also quoted in partial support of the doctrine. The term *neurogram* is adopted for the brain residua or brain dispositions here in question after the analogy of the term *telegram* or *marconigram*. Semon's term *engramm* as used in his book *Die Mneme* in 1908 is a somewhat similar term, but used according to Prince in a broader way than the term *neurogram*. "The unconscious is the great storehouse of neurograms, which are the physiological records of our mental lives."

Some of the conclusions of Prince resemble those of Freud, although Prince does not go the whole way of regarding the imaginary fulfilments of a suppressed wish as virtually always sexual.

¹A review of Healy's work by F. L. Wells appears elsewhere in this number.

Prince seems to commend the term *repression* introduced by Freud, and gives full credit to Freud for his notion of dream analysis; although he states that it must not be assumed that all dreams are determined by a subconscious process or that all are symbolical. "On the contrary, from evidence in hand there is reason to believe that some dreams have substantially the same mechanism as waking imaginations, subjected to the limitations imposed by existing dissociation of consciousness during sleep." Prince has been forced to the conclusion that a dream may be the symbolical expression of almost any thought.

Chapter 15, on the instincts, sentiments, and conflicts, levies extensively upon McDougall's social psychology. Prince quotes especially McDougall's notion of the will as a complex from the conation issuing from a particular sentiment, namely, the complexly organized sentiment of self ("self regarding sentiment"). Prince believes that the data of psychopathology show that self-consciousness is indeed a complex capable of being dissociated like any idea or sentiment, as in the quasi pathological state known as depersonalization.

Chapter 14, on the physiological manifestations of emotion, disregards the James-Lange theory of emotions as untenable and draws particularly upon the work of Pawlow and Cannon. If fear be taken as a typical emotion, then a schema of its most striking phenomena would be:

- Fear (from the mental side)
- Inhibition of thought
- Pallor of skin
- Increased perspiration
- Cardiac palpitation
- Respiratory disturbances
- Tremor
- Gastric and intestinal disturbances
- "Thrills"
- Feeling of compression in the chest
- Headache
- Nausea
- Pains
- Fatigue

The much abused concept of conflict seems to be built more or less upon the analogy of Sherrington's antagonism in certain spinal reflexes. The term *complex* is used in the general sense of any

mental experience, as in the common phase of association of ideas, and not in the restricted sense of Titchener, as the equivalent of a perception.

The ninth lecture deals with the organization of unconscious complexes or systems of neurograms. Prince posits unconscious dynamic relations which, without employment of consciousness, may become effective in exciting one idea through another, as it were, through a linking of neural dispositions. Prince follows Shand in his definitions of instincts organizing about one or more ideas to form sentiments. Prince promises a further book on the psychogenesis of multiple personality.

Goddard presents, in *Feeble-Mindedness: Its Causes and Consequences* (17), the important mass of data promised us two years before in *The Kallikak Family*. As psychologist and sociologist, Goddard has in mind the "problems" of human congregate life—crime, immorality, pauperism, alcoholism—and the burden of the book is to show how much those problems resolve into that of feeble-mindedness. That is, certain criminals, certain immoral persons, certain paupers, certain alcoholics, as well as certain other asocial persons, are not irresponsibles but incapables. Goddard estimates that from 25 per cent. to 50 per cent. of our prison population, 50 per cent. of our prostitutes, 50 per cent. of our almshouse inmates, are feeble-minded. This suggestion, looking to wide extramural application, is founded upon work with institutional cases of feeble-mindedness, tested by the Binet-Simon intelligence-tests and studied in their family relations by extensive field-work in the modern manner. The result of the investigation is to show more or less numerous feeble-minded persons in the families of about two-thirds of all cases (198 in 300) and more or less numerous neuropathic (but not feeble-minded) persons in the families of 12 per cent. more (37 persons). Goddard's calculations from his charts seem to show that feeble-mindedness is in all probability transmitted in the Mendelian manner. Accordingly, the principle of eugenic procedure is already in the hands of society, and a certain relief from the devastations of crime, immorality, pauperism, and alcoholism would only wait upon the discovery of practical measures for the application of said eugenic procedure.

Goddard speaks of his results as startling, and they evidently demand especial consideration. There are perhaps a few exceptions that might be taken; but, without entering a detailed critique, I wish to quote a number of sententious statements which will give some idea of the appealing nature of the book.

"There are all grades of responsibility, from zero to the highest. . . . Responsibility varies according to the intelligence. . . . As Binet points out, normal intelligence is a relative matter. . . . The persons who constitute our social problems are of a type that in the past and under simpler environments have seemed responsible . . . but for whom the present environment has become too complex. . . . We must measure the intelligence. Knowing the grade of intelligence we may know the degree of responsibility. Knowing the degree of responsibility, we know how to treat."

"Environment will not, of itself, enable all people to escape criminality. . . . The criminal is not born; he is made. The so-called criminal type is merely a type of feeble-mindedness. . . . Every feeble-minded person is a potential drunkard . . . is bound to be the victim of his environment. . . . The number of persons in whom alcohol has produced a weakness of the will is comparatively small. . . . It is these weak-minded, unintelligent girls (morons) who make the white slave traffic possible."

From the later sections of the book, further quotations may be made.

"A mental defect or a low degree of intelligence is a characteristic of some human stocks, and the condition is transmitted as truly and accurately as color of hair, stature or any other character. . . . When this condition exists, as it often does, in an otherwise healthy family, we call it pure feeble-mindedness. . . . Low-grade children . . . more often children of good parentage than . . . high-grade (feeble-minded) children. . . . In hereditary feeble-mindedness the children tend to have about the same grade of mentality as the parents, consequently a large proportion of the children have a mentality of from seven to ten. . . . Fifty per cent. idiots in the hereditary group is perhaps due in part to . . . accident in addition to the hereditary factor; that is, they should have been morons or high grade imbeciles but accidents at, before, or after, birth reduced them to idiocy. . . . It is probable that a larger number of cases would establish . . . a new figure for the heritability of morons (i. e., Binet age, seven to twelve), namely, 85 per cent. . . . Case 314 . . . would seem to corroborate the suggestion made by Dr. Fernald that *idiots savants* are probably not feeble-minded but cases of dementia *præcox* or other forms of insanity."

"There is not a single case among our children in which it can be said that the alcoholism of the mother was clearly the cause of

the feeble-mindedness of the child . . . there is no evidence that the alcohol has even lowered the grade of the child (similarly, with paternal alcoholism). . . . Alcohol causes deaths and miscarriages. . . . Some influence (produces more alcoholics in the hereditary group) than in the others. What that something is, is the lack of control characteristic of those persons that belong to families where there is hereditary feeble-mindedness. . . . In alcoholic families the average number of children is about one more than in the non-alcoholic families. . . . The number of miscarriages is practically doubled in the alcoholic group. . . . Everything seems to indicate that alcoholism is itself only a symptom, that it for the most part occurs in families where there is some form of neurotic taint, especially feeble-minded. . . . One may say without fear of dispute that more people are alcoholic because they are feeble-minded than *vice versa.*"

"Feeble-minded people are not nearly so promiscuous in their sexual relations as we might at first expect. . . . The sexual instinct in these people is underdeveloped rather than overdeveloped. . . . Overdevelopment of the instinct, in many cases at least, proves . . . to be simply an excess due to lack of control."

"Neurologically, insanity results from a brain that is diseased while in the case of feeble-mindedness the brain has never attained normal development. . . . A feeble-minded person is a person with a dwarf brain, not necessarily in size it is true, but in function."

"The Binet-Simon Measuring Scale of Intelligence differentiates, fairly accurately, insanity from feeble-mindedness. . . . A child suffering from simple arrest of development goes to a certain point in the scale, then stops rather abruptly, whereas a person with a diseased brain will answer a part of the questions in a number of different years, missing some questions in all of these years. . . . This 'scattering,' as it is called, has been proved to be characteristic of epilepsy and insanity."

"Not only is there no close relationship between insanity and feeble-mindedness, but . . . these two types of abnormal mentality belong at opposite ends of the physical scale. . . . The feeble-minded person (belongs) to a strain that has not yet developed to the higher levels of intelligence . . . a more primitive form of humanity, a vigorous animal organism of low intellect but strong physique—the wild man of today. . . . The moron . . . is largely free from the marks of degeneration, . . . has many of the physical

characteristics of a more primitive stock. . . . I believe that in cases of hereditary feeble-mindedness we are dealing with a mentality upon which it is absolutely impossible to graft any kind of genius; that there is no connection between feeble-mindedness and genius. . . . In our 300 family histories totalling 11,389 individuals not a single genius has been found. . . . There is no argument against eugenic measures for fear of cutting off possible geniuses by preventing procreation in families where hereditary feeble-mindedness exists. . . . Every feeble-minded person is a potential criminal."

"There is little evidence that syphilis is a cause of feeble-mindedness. The cases are very largely in the hereditary group. . . . There is nothing in consanguinity *per se*; but given a tainted family, the mating of two members of the same family increases the liability of the defect appearing. . . . Feeble-mindedness follows the mother to a certain extent; when she is feeble-minded there are more feeble-minded children than the expectation; when she is normal the actual number agrees with the expectation. . . . There may be something approaching a sex-limited inheritance."

"In the totals of all these matings (324) the expectation would be feeble-minded 704; the actual is 708; normal expectation 352, actual 348. Such results are difficult to account for on any other basis than that feeble-mindedness is transmitted in accordance with the Mendelian formula. . . . Normal-mindedness is, or at least behaves, like a unit character; is dominant and is transmitted in accordance with the Mendelian law of inheritance. . . . Should a high-grade feeble-minded person, whose condition is ascribed to neuropathic ancestry, be allowed to marry? and secondly, should a normal person, a brother or sister it may be, of such a defective be allowed to marry? . . . In the present state of our knowledge, neither the nearest friend nor the expert can go further than to give to a person from such a family, who suffers from any of these disabilities (feeble-mindedness or neuropathic condition), more or less urgent advice that he should not marry. . . . In the case of hereditary feeble-mindedness the situation is quite different. . . . If both parents are feeble-minded all the children will be feeble-minded. It is obvious that such matings should not be allowed. . . . When one parent is duplex normal (that is, has inherited normal-mindedness from both parents) and the other feeble-minded, all the children are normal but all are capable of transmitting feeble-mindedness,—we say technically they are simplex (that is,

have inherited normal-mindedness from one parent only). . . . (This) fact that all of the children of such matings appear normal has undoubtedly contributed to the argument for such matings. . . . It is the second generation, not the first, that shows the evil effects of such matings. . . . There are three kinds of marriages open to (the children of the first filial generation). . . . First, this simplex normal person marries a feeble-minded person, then according to the Mendelian hypothesis, half of the children will be feeble-minded, half will be normal, but simplex. . . . (Secondly) he may marry a simplex normal person like himself; the result here will be the Mendelian ratio of three to one, that is, there will be three normal children to one feeble-minded; but of these three normal children only one will be duplex normal, the other two simplex and capable of transmitting the defect just as their parents did. . . . No person who knows that he is simplex in regard to intelligence should marry a person who is also simplex. . . . (Lastly) he may marry a duplex normal person; the result here will be that all of the children will be normal but half of them will be simplex; the other half being duplex. From his own standpoint, this simplex person has done the one wise thing; this is what Dr. Davenport means by insisting that weakness should marry strength."

"Among several normal children, is there no way of telling which are duplex and which are simplex? . . . In certain fowls . . . (the) duplex fowl is absolutely white while the two simplex have a few colored feathers, known technically as 'ticks.' It is a very tempting notion to conceive that human beings might manifest some 'ticks'; that a simplex normal person would not be quite as intelligent as a duplex normal person; or that the simplex person would have some physical deformity or abnormality or peculiarity which may be taken as indicating the simplex character. . . . It may be that in the future such a thing will be demonstrated."

"One thing seems fairly obvious, a person whose family is tainted with defectiveness should not take any chances by marrying into a family that is also tainted. If a man knows that he and his family are entirely free then it is a problem as to whether he will take the chance of one in two or one in four, or whatever it may be, by marrying into a tainted family. . . . (As to) the control by society of the matings of those people who have not intelligence enough to control themselves, . . . it is clear that no feeble-minded person should ever be allowed to marry or to become a parent. . . . There are two proposals: colonization, sterilization.

Colonization is efficient and does not offend any of our sentiments. . . . Sterilization, even in the form of vasectomy, . . . could not under any laws as yet passed, or any that have so far been proposed, reach any considerable percentage of defectives."

"From a study of the insanity recorded on our charts it does not appear that a person who marries into a family where there is insanity would be in any special danger of having feeble-minded children. Insanity itself may be hereditary and enough to bar such a marriage, but the question of feeble-mindedness hardly enters unless it is a thoroughly neuropathic stock. . . . Every inmate of every almshouse should be examined as to his mentality and as to his family history."

The year has been distinguished by interesting controversies between various former members of the Freudian school. No extended consideration of the Freudian doctrines can be made here.

Régis and Hesnard have published an excellent exposition for French readers of psychoanalysis (35). The first part of the work deals with the theory of psychoanalysis, after describing and defining the history of the method. Its several features are taken up under the heads of psychodynamism, pan-sexualism, morbid sexual constitution, technique, dream analysis, association, ideas, and psychology of every day life. The second part of the work deals with applications: with sundry extra-medical applications (normal psychology, art and literature, physiology, pedagogy, sociology); thereafter with the neuroses, the psychoses, therapy. Final chapters deal with a psychological and a medical criticism of the method. Freud's schema is presented in diagram on page 21. Considerable light is thrown by French translations on the various technical terms employed by Freud. The French critics state that the method of psychoanalysis is an original and autonomous psychology with various very general tendencies, which tends to nothing less than to substitute itself for classical psychology. Its adherents consider that it is a method of mental examination which is fertile enough to make headway against the idea embodied in Möbius' well-known little work on the hopelessness of all psychology (*Die Höfungslosigkeit aller Psychologie*). It is in fact, according to Hitschmann, a genuine metapsychology. Freud's results as to the nature of wit, its social significance, and its sexual origin, stand out. Attention is called to the development of religion by psychoanalysis. Important are the pathographic studies of reformers, saints, and criminals, with the distinction of

women into two types: the maternal type as opposed to a less evolved type in which paternal features predominate. Racial distinctions are to be brought out; the English mind is perhaps to be characterized as the result of repression; for example, Régis and Hesnard characterize many of the critics of Freud as sentimentalists. These the psychoanalysts regard as in fact manifesting resistance or sexual repression (Hoche, Foerster, K. Mendel). More scientific critique has, however, been made by various Swiss, German, and French authors. Dubois deals with the psychotherapeutic principle; Kostyleff with the value of psychoanalysis in normal psychology; Ladame has dealt with the sex question; and Janet with special questions connected with hysteria. Régis and Hesnard state that Freudian psychology has the merits and defects of a system, and recalls metaphysics. Psychoanalysis is more or less a matter of faith, and has been compared by Janet to Christian Science. Kraepelin has termed it a metapsychiatry. Considering the unconscious as something real inside the mind, psychoanalysts have perhaps returned in some measure to the faculty psychology. The French critics believe that the psychoanalysts have constructed entities where no entities exist. The Freudian doctrines of the censor, of the sexual instinct, of personal instinct, of psychoanalysis, of dream, and the like, are thus, according to these critics, inspired by the ancient doctrine of final causes. The will to be diseased (*Wille zur Krankheit, volonté de maladie*) is a doctrine of entities which perhaps do not exist. They would regard the neurosis as a means of struggling against the psychosis. Instincts, all offspring of the sexual instinct, are such entities, namely: complexes, parasitic divinities, and familiar demons whose own unquenchable fury lodges in the unconscious. The idea of the internal struggle of the instinct of the ego and the instinct of the species is an entirely mystical idea. It is found at the basis of religion. Freudism is a form of mysticism and must be judged as are those works of art to be judged which Freudism itself is ambitious to explain. Psychoanalysis is itself a symbol, and the thought of its authors reproduces the constitutional errors of the human machine, obeying as it does the eternal anthropocentric illusion and perceiving the world in its own image. It is a question whether the Freudians might not regard this type of criticism as exhibiting the same repression with which such critics as Hoche may be charged.

Freud himself, in an article on the history of the psychoanalytic

movement (16), has said that the doctrine of repression and resistance is actually to be found in Schopenhauer. The dream symbolism, Freud states, is in part to be found in the work of Scherner and in that of J. Popper.

English readers will be especially interested in the progress made by the Freudian psychology in America. The twelfth volume of the *Review of Neurology and Psychiatry* for 1914 contains, besides a number of reviews, three articles on the topic, namely: Macie Campbell on "The mechanism of some phases of manic depressive excitement," L. Pierce Clark on "The mechanism of periodic mental depressions as shown in two cases, and the therapeutic advantages of such studies," and Ernest Jones on "The significance of the unconscious in psychopathology." A manic excitement, according to Campbell (13), may be the expression of an intense conflict in the patient's inner life. This conflict is not carried on "at the deep level where the schizophrenic tragedy is acted, but takes place on the very threshold of clear consciousness." The type of the action in such a patient can only be understood in the light of forces at the bottom of the individual character. Campbell's account seems to be understandable without any employment of the special notions of the libido employed for manic-depressive insanity by Abraham some years since.

Pierce Clark (15) believes that the mechanism of depression is to be interpreted on the basis of a severance of the activities of the libido.

Jones (24) attempts to analyze three principal current uses of the word *unconscious*. He states that the commonest use of the term *unconscious* as a synonym for non-mental begs the question by assuming that no mental processes can exist that are not accompanied by unconsciousness or unawareness. Conceptions of the Hartmann-Myers group, he terms the limbo conceptions. The third current use, Jones gives to Freud. The fundamental fact in the Freudian unconsciousness is that its very existence is the result of repression. "By this is meant that unconscious processes are of such a kind as to be incompatible with the conscious ones of a given personality." The incompatibility is in a wide sense moral. "The patient automatically refuses to acknowledge to himself their presence in his mind." The repressed mental material which we know as the unconscious is, in the second place, in an important sense dynamic. This is to say, conative. Unconscious processes may be described not inaccurately as wishes constantly striving

for gratification. The unconscious, thirdly, stands closest to the crude instincts born in us prior to their refinement by education. Without education "the individual would probably remain a selfish, impulsive, aggressive, dirty, immodest, cruel, egocentric, and conceited animal." Fourthly, the important period in life is infantile. "The splitting of the mind into conscious and unconscious regions takes place in the earliest part of childhood life," and this splitting is a result of the "conflict between the uncivilized and non-moral endowment with which we are born and the inhibiting forces that make for adjustment to the standards of society." Again, the unconscious, having a logic of its own, namely, the logic of the emotions, is from the more usual point of view, namely, that of reason, illogical. The unconscious "ignores all reasonable and logical considerations." The unconscious is predominantly sexual. "This is only what might have been expected from the fact that the unconscious is in a state of moral conflict with the standards of consciousness." Infantile sexuality is closely connected to the excretory functions. Incestuous fantasies are of normal occurrence. If Jung does not wish to regard these incestuous fantasies as real, and thinks they are "secondary products without dynamic initiative of their own," it is held by Jones that Jung's formula is dictated "by moral repugnance to a distasteful conclusion." Accordingly, the unconscious is a region of the mind, the content of which is characterized by attributes of being repressed, conative, instinctive, infantile, unreasoning, and predominantly sexual. A typical example of an unconscious mental process illustrating all of these would be the wish of a little girl that her mother might die so that she could marry her father. All psychopathological symptoms arise in the unconscious. Psychopathological symptoms are, in fact, compromise formations produced through the conflict between unconscious and conscious tendencies. People relapse from sublimation, namely, a diversion of repressed unconscious trends to permissible social aims and "regress to more primitive modes of functioning. But the process of regression is foiled to some extent by original repressing forces."

The year 1914 has been characterized by a certain tendency to the splitting up of the Freudian school, or more properly speaking to the literary reaction of an earlier splitting. Freud, in the paper quoted above, cleverly makes capital of this fact by stating that similar splits occur in all scientific movements but are usually more carefully concealed. Psychoanalysis is more sincere than other movements have been in failing to conceal its fission.

Voss and Oettli of Düsseldorf have contributed to the seventeenth volume of the *Jahresbericht über die Leistungen und Fortschritte auf der Gebiete der Neurologie und Psychiatrie* (43) a general review of psychological literature having medical interest, together with a bibliography of 629 titles, including four by Abraham, six by A. Adler, seven by Bechterew, nine by Birnstein, nine by Bleuler, five by Ferenczi, eleven by Stekel, five by Titchener, and five by Ziehen. Much attention has been attracted by Bechterew's so-called psychoreflexology. Psychoanalysis is prominent. The review of Voss and Oettli occupies 71 pages and is divided into sections dealing with general considerations, sensory and motor processes, the psychology of the child, the race, sex, and animals; the psychology of association, memory, attention, and consciousness; psychology of complex processes, suggestion, hypnosis, psychotherapy, psychoanalysis. Outstanding in these reviews, in addition to the features noted above, are, from the pathological point of view, Meumann's suggestions for improvement in the prevailing intelligence tests. The international application of the methods of Binet and Simon has shown the dependence of the intelligence of children on the social status of the parents. Seventy-five per cent. of children may be regarded as normal, 21 per cent. as subnormal, and about 4 per cent. as supranormal. Stern and Bloch have also made comparative studies with the Binet method. Marbe, in two articles, has taken up medico-legal problems, and has published a book on the subject. The critiques of Bleuler, Kronfeld, and Régis and Hesnard are especially commended.

Bleuler (9), under the title *Verhältnisblödsinn*, states that v. Gudden termed the cases in question "high-grade dement," being such persons as can live in society, get on in school, and even work in places requiring literacy, without being able to combine ideas properly, and fail in practical life. Hoche is said to call these patients "salon idiots." Bleuler describes three patients: a poet, a nature healer, and a would-be philanthropist, together with certain more complicated cases. Bleuler believes that there exist persons who fail in life and are termed demented, simply because their impulses assign tasks to their understanding for which the latter has never been developed, although it is sufficient for ordinary vital relations. Often there are habitual maniacal tendencies at the bottom of this form of mental disease. There is a great uncleanness in thinking in cases so far described, although speech and conduct are well preserved. There are also forms of moral *Verhältnisblödsinn*.

The medical man is somewhat at a loss to understand why Healy (21) needs to lay stress upon individualization since the medical man with any leanings to theory whatever feels that his colleagues are, if anything, far too individual in their attitudes to patients, and far too prone to look on statisticians as a pseudological pest. The point of Healy's work and its crying necessity is not that the medical man needs to be hounded into greater individualization in his diagnosis and treatment of asocial and psychopathological cases, but that the Bench and Bar shall be excited to supplement their formulæ by greater consideration of the individual. In line with such modern thinking are those portions of Roscoe Pound's *Sociological Jurisprudence* which have as yet appeared (compare *Harvard Law Review*, 1915).

Kronfeld (27) writes upon the logical relation of criminology to psychopathology, with special relation to the so-called moral imbecile. The fundamental problem of all criminology forms a part of the still greater sociological problem; as to whether there are any laws relating to mental makeup, milieu, and the course of life. Criminology wants to get types of this relation so far as it is anti-social. Materials have now been collected to such an extent that they can hardly be digested. Kronfeld objects to a prevalent notion of ideal criminal types. Jaspers, in his *Allgemeine Psychopathologie*, has according to Kronfeld erroneously set up this notion for psychiatry. Jaspers wishes to secure psychopathological types by an inductive method. The most burning problem on the psychiatric side of criminology is that of the moral insanity of Prichard in 1835. Kronfeld points out that Prichard used the term *moral* in a much broader sense than the Germans used the word *moralisch*; using it, in fact, to cover the attitude, character, and demeanor of the individual. Moral insanity is, in one sense, an insanity of attitude. The antisociality constitutes the insanity. On account of various difficulties, Aschaffenburg (1903) and others have given up the term *moral insanity* and now might make the diagnosis: "Not insane; moral imbecile." The German conception of this situation has been built up further by Berze, Anton, and Leppmann. That subjects like those described by Prichard exist there is no manner of doubt. In the first place, these subjects are incorrigible and become recidivists. This incorrigibility, it may be said, depends upon individual predisposition. One may attempt to solve it by the anthropological route. Yet, before pursuing this route, one must separate off in practice the cases of mental

disease such as non-criminals often possess. Accordingly, one must pursue both anthropological and psychological methods in the further delimitation of the subjects of so-called moral insanity. Kronfeld accordingly wishes to rehabilitate psychological methods in the analysis of criminals by way of compensating for the tendencies brought out by Lombroso. Bleuler upheld this point of view in 1896. Bleuler supposed that there are certain functions of the cortex which in their totality lie at the basis of character and morals, and he supposed that these might be separately defective, laying the burden of proof on one who should think otherwise. Berze has attempted to divide the subjective basis of morals into a morality of feeling, a morality of understanding, and certain pseudo moral inhibitions. Kronfeld wishes to distinguish what he calls *Zeitmoral* from more *a priori* moral principles. The *Zeitmoral* depends upon all sorts of special geographical, historical, and other factors, of the particular age in which the subject lives. The structure of this special morality varies with time and progress. More important is the manner in which its facts are passed over to the individual. Social instincts are among the emotional bases of *Zeitmoral*. Education, laws, and punishments have a bearing. Egoism, response to the nutritive and sexual impulses, and the like, have a bearing on the individual's grasp of the *Zeitmoral*.

Now is it possible for separate defects in one or other of these groups of moral bases to exist and have a bearing upon the moral attitude so as to bring about moral insanity, or, as we now say, moral imbecility? Leppmann had roughly distinguished what might be called the victims of moral color blindness from those who are not entirely deficient in altruistic feelings but are a football of emotions. These types evidently need special psychological examination. Kronfeld then considers the social factors as the criterion of these psychic types, distinguishing the concept of reactivity from that of dependence upon a milieu. There will be found reactive types, and such reactive types must obviously be the particular subjects of criminal psychology. The concept of genuinely *criminal* tendencies here falls to the ground from the psychological standpoint. There are perhaps no "criminal" types but there are various psychic types which may lead to the same social attitude but do not necessarily lead thereto. There are two groups: the moral imbeciles without emotional basis, and the erethic imbeciles without inhibitions based upon the *Zeitmoral*. The two types are at bottom different also. Their effect may be

so far as it is expressed in action the same. Among the cases depending upon milieu we may distinguish, in the first place, the individual who, as a passive amorphous plastic mass, is transformed and made over constantly by every milieu and accident of milieu. Another individual, also dependent upon milieu, is plastic, not with the totality of the mind, but with special limited parts of the mental life and social attitude. These cases are cases of character anomaly and misfit, which may be pre-formed but remain latent and without result unless they are actualized by the milieu. In both instances, the effects are actual milieu effects. A third kind of milieu dependence is the possible situation that, whatever the mental basis of the subject may be, the influence of the milieu is not so enormous that it cannot be overcome by other factors. The majority of socially living men belong to this last group. They are protected by their mental constitution from sliding off into anti-social reactions.

From Bonhoeffer's clinic, Salomon (36) has presented an elaborate study of a case with agrammatism and sensory agrammatic disorder. The case had been previously described in 1909. The case is studied as to aphasic disorder under the following heads: Spontaneous speech, speech from dictation, speech from dictation of senseless syllables, Lichtheim's test of Thomas-Roux, sound images, speech from dictation of short sentences, serial speech, recognition of objects, understanding of speech, reading, writing, spelling, with ordering of letters and syllables, reading numbers and calculation, *Merkfähigkeit*, subjective account of the patient as to internal speech, apraxia tests. The discussion deals with the work of Bonhoeffer, Heilbronner, Jacobsohn, Thomas-Roux, and others. As to agrammatic disorder, the case is studied under the following heads: Forming and ordering of sentences, completion of sentences, assignment of articles to words, finding of adjectives for their nouns, declension and comparison, conjugation, pronouns, use of prepositions, repetition of difficult verbal forms, incapacity to detect false words and sentences, false syntax, answers to questions made senseless by transposition of words as if they were sensible, disorders of understanding of speech as a result of agrammatism, disorders of understanding of reading as the result of agrammatism, understanding of idioms, agrammatic manner of expression. Agrammatism is discussed in the light of v. Monakow, Bonhoeffer, Heilbronner, and especially of Pick. Further tests were made of a knowledge of foreign languages. A special musical

examination was given. Salomon believes that his case shows that the motor speech region plays an important part in the inward calling up of words. A part of the disorder found in aphasias may be explained as due to the rapid loss of auditory images and subsequent deficient motor fixation. The so-called telegraphic dispatch style of agrammatism is a phenomenon of difficulty in understanding long sentences frequently observed in motor aphasias when hearing is due to the agrammatism and is not to be regarded as a sensory agrammatic disorder. A motor aphasic who can whistle and sing simple melodies perfectly fails in the repetition of themes requiring greater motor power. Assertions to the effect that aphasics are always demented and that agrammatism is to be regarded as the result of a general intelligence disorder, are incorrect.

Stertz presents from Alzheimer's clinic in Breslau a study on so-called conduction aphasia (38). The case is less elaborately studied than that of Salomon, but the discussion is more elaborate. There is an analysis of six cases, including that of the writer, summed up under the main heads of understanding of speech, ability to speak, ability to speak on dictation, spontaneous speech, finding of words (amnestic aphasia disorder), reading and writing, understanding of reading.

Pick (32) deals with the perseveration and other mechanisms as a cause of agrammatic disorder. An interesting polemic has sprung up as to motor and sensory agrammatism, genuine agrammatism being regarded as related to Broca's area, and a secondary sort related to the temporal lobe. The mental functions of grammar and syntax are regarded by Bonhoeffer and Heilbronner as more often related to Broca's area.

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SPECIAL REVIEWS

The Individual Delinquent: A Text-book of Diagnosis and Prognosis for all Concerned in Understanding Offenders. W. HEALY. Boston: Little, Brown, 1915. Pp. 830.

During some six years the author has had brought to him, largely through court sources, a great many cases of young persons, who have failed to adjust themselves socially, and have reacted along criminal lines. The book is a record of this experience.

At the risk of triteness let it be said at once that what one is to get out of the book depends much on what one brings to it. A reader who, like the reviewer, starts out four-square upon the dynamic basis on which the book is also grounded will find its chief value in the more definite formulations of the author's experience, such as the breaking down of the anthropometric criteria of criminality, the ineffectiveness of newspaper suggestion in delinquency, the necessity of the punitive concept and the like. Its psychological viewpoint is of the healthiest and there are few, if any, presentations of this viewpoint so likely to be convincing to the general reader. The references seem well chosen and well digested. The faults are those of a work which is so well done as to be very well worth doing better.

The strong outstanding feature of the volume is the conception of criminal reactions as maladjustments in much the same sense as we conceive of some mental aberrations as "maladjustments"; where the problem of scientific criminology becomes one of mental sanitation and adaptation. Much critical perception is shown in the weighting of different causative factors in delinquency. There is no special leaning to either heredity or environmental factors; some stress is laid on the appearance of individual delinquents among groups of non-delinquent siblings.

The usefulness of the book suffers most from the lack of a particular system in the data. Paragraphing, summarizing and indexing there is in plenty, but of psychological analysis very little. One must not study his cases so "individually" as to lose sight of previous experience which bears upon it, yet this is bound to happen unless there is some grouping of features or symptoms of the cases that are of value for prognosis or management. It seems that

more of this could have been given. Analysis of the material along the lines very suggestively stated by Karpas, ought to prove very helpful. Possibly the author's experience showed that it was not so, but this is not clear from the book.

The author is not blind to the fact that effective following of the cases is as necessary in scientific criminology as it is in psychiatry, though unhappily the histories must often terminate with the causative factors card and the recommendations for treatment, without affording information as to the later developments in the case. But as a matter of routine, there should surely be a space on the much quoted cards for some indication of the case's further history, positive or negative.

The author's attitude toward psychoanalysis is distinctively well-balanced. He rejects the more recondite symbolisms put forward in the school, but does not make these a rationalization for ignoring the considerable gains to be made through the more intimate personal understandings that it favors. The chapter on mental conflicts makes a very instructive presentation of cases in which the tangles, mostly of a psychosexual character, seem to produce a sort of "substitutive reaction" of delinquency.

These are the natural consequences of the false conventional attitude in the sphere of sex, and the good of overcoming this the author fully recognizes—it is indeed difficult to regard the arguments for suppression as other than rationalizations of temperamental inadequacy to deal with the topic. With most of us, unfortunately, insight into the character of these resistances does not at once do away with them. Our learned author would be more convincing with evidence for a better removal of this particular two-by-four from his own corneal surface. Compare such expressions as "not been really immoral"; "local inflammation"; "abject details of low sex practices"; "flagrant female impersonations"; "most effeminate type of sex perversions"; "even soliciting the worst sorts" (of homosexual relations). The reviewer cannot repress the thought that one should acquire more freedom in the use of the existing terminology before adding to it such dispensable words as "sexualism" and "sexualistic."

Quite noteworthy is the part which imaginations, *Einbildung*, especially of a sexual nature, appear to play in the unbalancing of his cases. Not more than the usual stress is laid upon the experiences of custody, and the *Haftpsychosen* do not seem to have come especially to his attention. The whole psychiatric section

is not up to the rest of the volume and can be much bettered in connection with some manual of the subject, such as the text-books of Rosanoff and DeFursac, or White, or for that matter, Kraepelin.

The portions on experimental psychology will repay careful reading by the laboratory investigator. The author has learned that in work which must stand the test of action one must openly face things that he who is content with the "facts, not the personality" can afford to let alone. He lays a good deal of weight on emotional factors not controlled in ordinary experimentation. He gives valuable suggestions on technique with different sorts of subjects, and on the furnishings of the laboratory. He discusses the standardization of instructions, and supplements Whipple's very just appreciation of adventitious observations during experiments. He gives a fair valuation of the Binet series—it is best below 10 and 11 but is one sided. One must keep clear of the language factor so far as possible. He quotes some special cases of linguistic ability developed out of proportion to other mental faculties, a phenomenon not confined to delinquents, and which is the foundation of Ossip-Lourié's *Verbomanie*. The experimental tests of suggestibility when positive seem to correlate well with the same quality outside. In its relation to sexuality there is some analogy between Healy's findings and the theories of Ferenczi (*Introjektion u. Uebertragung*). Tests of moral perceptions have not been of much value. A series of twenty-three tests is described in which, as might be expected, those of the choice reaction type have a dominant role. From the use that is made of them in the volume it is plain that their value depends more on personal experience with them than on familiarity with normal "results" and the technical ability to make them. Such experiments are, essentially, standard situations to which the subject's whole reaction is to be observed.

Perhaps the greatest diagnostic value of the tests proved to be for deficiencies from "bad sex habits." There are especially marked fluctuations in experimental performances, while tests that do not require enduring concentration may be done well. Improvement could be secured in these cases where the above factors could be corrected.

In all, Healy has shown that work of the kind he set out to do can be done; he has shown less of how to do it. The reviewer could tomorrow enter upon the work with a considerable access of confidence in accomplishing it but with very little additional idea

of the means and methods therefor. This must still depend upon one's unanalyzed powers. There are, perhaps, many persons drifting in and out of institutional supervision, never managing to adjust themselves to life, who might, under a highly individualized scheme of management, be guided through normally happy and not asocial lives. But this is apt to require large material resources and special intelligence in spending them, which are seldom present together. So long as the ameliorative treatment of these cases remains in the very individualized state in which Healy finds and leaves it, so long must it remain confined to those few individuals who are fortunate enough to have a Healy to prescribe, and a "high-minded and practical" good fairy to provide the changed environment for them. To do this generally as well as it can be done individually would be an intolerable burden to the state. Frankly, the state owes the most to those who serve it best, not to those who must continually be kept from injuring it. Here the balance must be struck between the degrees of freedom and innocuousness which can be had for what the state can afford to spend. For the "patient" this balance has been struck fairly, in some cases remarkably, well; for the "prisoner," very badly indeed. But a little over a century ago the situation was relatively as bad for the "insane" person as it is for the criminal today. From such foundations as are laid in this book we shall some day look upon our present dealings with the criminal as we now look upon what was, as Farrar reminds us, our management of mental diseases before the days of Chiarugi, Tuke, and Pinel.

F. L. WELLS

MCLEAN HOSPITAL

Mental Deficiency. Amentia. A. F. TREDGOLD. London: Baillière, Tindall & Cox, 1914. pp. xx + 491.

A new edition of the well-known text-book, first published in 1908. New sections deal with mental tests and case-taking and the new English law. The table of synonyms is interesting and suggests a classification of conditions and persons, as follows: CONDITIONS: 1, Amentia (generic term for what we in America call feeble-mindedness); 2, idiocy (low grade); 3, imbecility (medium grade); 4, morosis (high-grade, i. e., Fr., *débilité mentale* or *faiblesse d'esprit*; Ger., *Halbechzwach-sinnigkeit* (?), *Schwachbefähigkeit*; or the English "feeble-mindedness" proper); 5, *simplicitas rel stupiditas rel fatuitas*; 6, *amorālia* (amentia associated with persistent

criminal or immoral conduct). PERSONS: 1, aments (generic term); 2, idiots; 3, imbeciles; 4, morons; 5, simples or stupids or fatuous; 6, amorales.

E. E. S.

The Meaning of Dreams. L. H. CORIAT. Boston: Little, Brown, 1915. pp. xiv + 194.

Coriat classes Freudian dream analysis with the origin of species and organic evolution. "Everybody dreams, and every dream means something." The account is apparently pretty strictly Freudian. There is an original diagram (on Eulerian lines) picturing how a dream is made, including the "censor" active during sleep "which guards the portal going from the unconscious to the conscious, thus preventing the emergency of painful complexes from the former."

E. E. S.

Sémiologie des Affections de Système Nerveux. DÈJERINE. Paris: Masson, 1914. pp. xxvi + 1212.

A revision of Déjerine's *Sémiologie* published in Bouchard's *Pathologie Générale* in 1900. Chiefly valuable to psychologists are the first two chapters on disorders of intelligence and of language. The latter is of value to psychopathologists as reasserting classical views of aphasia as against the supposed heterodoxies of P. Marie.

E. E. S.

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- CANNON, W. B. *Bodily Changes in Pain, Hunger, Fear, and Rage.* New York: Appleton, 1915. pp. xiii + 311. \$2.
- BRUCE, H. A. *Sleep and Sleeplessness.* Boston: Little, Brown, 1915. pp. ix + 219. \$1.
- CORIAT, I. H. *The Meaning of Dreams.* Boston: Little, Brown, 1915. pp. xiv + 194. \$1.
- PUTNAM, J. J. *Human Motives.* Boston: Little, Brown, 1915. pp. xvii + 179. \$1.
- WATSON, J. B. & LASHLEY, K. S. *Homing and Related Activities of Birds.* LASHLEY, K. S. *The Acquisition of Skill in Archery.* Washington: Carnegie Institution, 1915. pp. 128.
- CURTIS, H. S. *The Practical Conduct of Play.* New York: Macmillan, 1915. pp. xi + 330. \$2.

NOTES AND NEWS

THE present number of the *BULLETIN*, dealing with psychopathology, has been prepared under the editorial direction of Dr. E. E. Southard, of the Psychopathic Department of the Boston State Hospital.

FREDERICK M. GERLACH, A.M., has been appointed instructor in psychology and education in Colorado College, and will be in charge of the experimental work in these subjects.

DR. COLIN A. SCOTT, head of the department of education in the Boston Normal School, has been appointed professor of education in Mount Holyoke College to succeed Dr. C. C. Kohl, who has been appointed associate professor of secondary education in New York University.

The following items have been taken from the press:

THE University of Vermont has conferred the degree of doctor of letters upon Professor James R. Angell, of the University of Chicago.

DR. STEFAN WITASEK, professor at the University of Graz, has died.

THE
PSYCHOLOGICAL BULLETIN

GENERAL REVIEWS AND SUMMARIES

RECENT LITERATURE ON TROPISMS AND
INSTINCTIVE ACTIVITIES

BY A. S. PEARSE AND GERTRUDE M. WHITE

University of Wisconsin

Allee (1, 2) asserts that the rheotactic reaction alone is not sufficient to account for the position isopods assume in streams, and that the thigmotaxis is also of importance. The molting period and breeding season are important in the ecology of stream isopods since they decrease the clinging ability. Other experiments show that the survival time in potassium cyanide is, for *Asellus communis*, inversely proportional to the rate of metabolism. Since isopods which are strongly positive to current have a much shorter survival time than those which are indifferent, it appears that high positiveness to current is an expression of a relatively high rate of metabolism.

Allen's (3) investigations show that in fresh water mussels the surfaces of the gills, the end of the upper part of the mantle, and the labial palps serve to carry food to the mouth. The food supply is not regulated but the amount of digestive juices secreted, and hence of digestion accomplished, depends upon the need for food. Digestion seems to be mostly accomplished in the stomach as few living organisms were found to have entered the intestine. A discussion of the possible use of the crystalline style is given.

Armbruster (4) in a very interesting paper on humble-bees describes the architecture and building materials of the nests, relation of sexes, color varieties, and orientation. He believes that bees usually find the way back to the hive by "optical signals"

but that they are also, after they have traveled a route many times, able to find it "blind" as an expert player is able to pick out the keys on a piano.

Babcock (5, 6) has made observations on the hibernating habits of the jumping mouse. Torpidity is periodic at the beginning of the season, lasting for only short intervals. The length of the period of hibernation is probably not entirely determined by temperature. In another paper this author states that the shrew, *Blarina brevicauda*, consumes very large quantities of food, sometimes several times its own weight in the course of a day. Since its food consists mainly of insects, other small animals, especially mice, and a little vegetation, it is of great economic importance.

Banta (7) writes an interesting description of the mating behavior of the wood frog, *Rana sylvatica*. Usually a female is clasped by but one male. Occasionally she may be pursued by a number, and a battle ensues in which she is often the one to suffer. It is possible that in sex recognition color and the peculiar behavior of the female play a part, but finally a chemical sense seems to be involved, although the one experiment designed to test this was unsuccessful.

Beck (8) discusses the importance of electrical phenomena in the central nervous system of the frog and presents experimental work.

Bittner, Johnson, and Torrey (9) have reexamined the reaction methods of the earthworm to light. They maintain that there are neither random movements nor "trials," but that orientation is direct.

Using very sensitive apparatus Bose (10) has studied the rate of transmission of excitation in the sensitive plant. The latent period grows shorter as the stimulus is increased until the minimum is reached, the shortest being 0.06 second. Variation in temperature influences the rate of transmission (12.5 mm. per second at 31 degrees C.; 6.6 mm. at 23 degrees C.). From various experiments with electricity and temperature Dr. Bose concludes: "These results prove conclusively that the transmission of excitation in the plant is a process fundamentally similar to that which takes place in the animal."

Brunacci (11) finds that the frog, *Rana esculenta*, is greatly affected internally by changes in the concentration of its liquid environment. 10 per cent. solution of NaCl is maximal. Beyond this great metabolic changes occur in the water content of the tissues.

Buttel-Reepen (12) gives a lengthy review of the continental work on the relations of bees to flowers and discusses some observations of his own. He believes that odor is less important than color in attracting bees to blossoms. He also asserts that, though humble-bees often break through the corolla to rob flowers of their nectar, honey-bees seldom do so.

Cameron and Brownlee (13) have investigated the ability of frogs and their tissues to survive low temperatures. They give a complete review of recent literature and present experimental work. "Frogs freeze at a temperature of - 0.44 degree C. to - 0.02 degree C. in a manner very similar to that of solutions isotonic with their body-fluid." Heart tissue will survive a temperature of - 2.9 degrees C. Frogs probably die at low temperatures on account of a specific effect on the brain or spinal cord.

Cowles (14) found that the starfish, *Echinaster spinosus*, when put into a black box illuminated from above would nearly always move toward a white card placed on one side of the wall. He believed this reaction was caused by the reflection from the card which caused the side of the starfish nearest to it to receive more light.

Crozier (15) finds that *Holothuria captiva* is photokinetic, its whole surface being sensitive. Although this sea-cucumber does not respond to an increase in intensity of light, it withdraws when shaded. It moves only with the anterior end in advance and is negatively phototropic. The green fluorescent integumentary pigment probably acts as a sensitizer.

Experiments were performed by Miss Dale (16) to determine the limits of hydrogen ion concentration fatal to *Paramoecium*. The action of the hydrogen and hydroxyl ions and of the polyvalent kations and anions may perhaps be ascribed to the power possessed by these of conferring electric charges on colloidal materials with which they come in contact.

Dice (17), in an excellent paper on the movements of *Daphnia* discusses the effects of temperature, light, gravity, mechanical stimulation, chemical content of water, age, and other factors. He concludes that, "the diurnal movements of *Daphnia pulex* are caused chiefly by changes in light intensity. The limits of the diurnal movements are determined by the factors effective in producing the seasonal movements. . . . Much of the behavior of *Daphnia* is determined by orientation to various stimuli, but some regulatory behavior is obtained by means of random movements.

. . . Change in geotaxis by changes in light intensity and in temperature has been observed in other plankton organisms, and is probably of widespread importance in determining the vertical movements of plankton."

Dupont (18) states that the mechanical irritation of the semi-circular canals in cartilagenous fishes causes reflex movements of the eyeball.

Hahn (19) describes the hibernating habits of the bear, wood-chuck, bat, and ground squirrel. He had a pet ground squirrel which, although kept in the laboratory, slept for varying lengths of time whenever the room temperature was allowed to fall near the freezing point.

Hamilton (20) has studied the sexual behavior of monkeys confined in large cages or allowed to run free out doors. "At least two, and possibly three different kinds of hunger, or needs of individual satisfaction, normally impel the macaque toward the manifestation of sexual behavior, viz., hunger for sexual satisfaction, hunger for escape from danger and, possibly, hunger for access to an enemy." Homosexual relations are of common occurrence, even when members of the opposite sex are present.

Kanda (21) discusses mechanical, pressure, resistance and statocyst theories of geotropism with reference to *Paramoecium* and *Spirostomum*, concluding that the statocyst theory is probably correct, though not yet proved. He also shows (22) that the negative geotropism of the larva of *Arenicola cristata* is reversible by calcium and magnesium salts, but not by sodium and potassium salts. This is probably due to the Mg^{++} and Ca^{++} ions. The positive reaction to light is negatived by $NaCl$, KCl , $MgCl$, and by seawater after exposure to $CaCl_2$ solution. Acids, alkalis and narcotics, so far as tried, did not reverse the geotropism of this larva.

Lashley (23) notes two instances of the persistence of the sucking instinct of cats into adult life.

Levick's (24) account of the nesting habits of Adelie penguins gives many points of interest. The males fight for mates but the victor does not always get the female sought. "As a rule it is the strongest and cleverest fighter of the group; but, curiously, this is not always so, as sometimes the bird who has undoubtedly proved himself the victor suddenly walks off, and by general consent his vanquished opponent is left in possession of the field." The recognized suitor must next be accepted by the female, and is often kept courting for some time. Once a pair is mated, how-

ever, no bachelor male can break up the match. The cock fetches stones for the nest, which the hen builds. "The adult birds are very fond of playing games." In order to have time for such recreation and to feed, they take turns with the incubation and the care of the young. A number of pairs may coöperate in the latter duty.

According to Lillie (25) the irritability of living organisms is due to changes in the permeability of the plasma membrane. These changes depend upon slight variations in external conditions, especially electrical phenomena. Variations in the speed of response and sensitivity depend primarily on the specific peculiarities of the plasma membranes of different tissues.

McIndoo (26, 27) has made a careful study of the olfactory sense in insects. He makes an extended review of the literature on the subject and concludes "that the organs called the olfactory pores by the author are the true olfactory apparatus in Hymenoptera and possibly in all insects and that the antennæ play no part in receiving odor stimuli . . . it will be realized that the antennæ can no longer be regarded even as a possible seat of the sense of smell in insects."

Polimanti and Mares (28) have been disputing about the condition of animals during winter sleep. The former accuses the latter of saying that during hibernation mammals are in a hypnotic state, the usual heat-regulating mechanism not functioning, and they show atavism in that they "return" temporarily to a condition like that in cold-blooded animals. This Mares does not deny but takes exception to Polimanti's assertion that he stated that bile- and gall-secretion were at a standstill during hibernation.

Mast (29) in discussing Euglena's method of orientation to light maintains that its responses are brought about by changes in light intensity, contrary to the assertions of Bancroft and Torrey. He also gives a very good discussion of the "trial and error" and "tropism" theories and advocates the abandonment of the latter term because it has been given so many meanings by different authors.

Patten (30) has attempted to standardize the reactions of blow fly larvæ to light by subjecting them to the simultaneous action of opposed horizontal beams of light of known intensity. When the two lights were of equal intensity the larvæ followed an almost straight course perpendicular to the line connecting the two lights. When the lights were unequal they showed a deflection toward

the weaker light, the deflection being proportional to the intensity differences. An arrangement of bilaterally sensitive areas is suggested. The phototactic response is said to depend to a large extent on the stimulating effect of constant light and to follow the Bunsen-Roscoe Law.

Pearl (31) reports observations on the brooding instinct of Barred Plymouth Rock chickens. This instinct normally constitutes one element in the cyclical reproductive activities of hens. Though it usually recurs with greater or less regularity following periods of laying, it may appear in pullets which have laid only one egg and that some little time before. Broodiness appears rather suddenly and usually disappears slowly. Its manifestation is apparently closely connected with the functional activity of the ovary.

Hipps's (32) experiments with three species of amphipods seem to indicate that they respond negatively to changes in light intensity but are more strongly influenced by the direction of rays. When treated with depressing agents such as KCN, chloretone, CO_2 , and when in a starved condition, many reverse their reaction probably on account of changes in their metabolic processes.

Powers (33) concludes that crayfishes are able to discriminate increases in CO_2 , and acetic or hydrochloric acids in a gradient, different species reacting to these substances in varying degrees. In general the reaction to hydrochloric acid is the most decided, that to acetic acid next, and that to CO_2 the least marked.

According to Roule (34) one of the biological conditions of the migration of salmon up streams is the seeking on the part of the fish of water which is richer in oxygen.

In his little book on the flea Russel (35) describes the sense organs, feeding and mating habits in considerable detail.

Shelford (36) compares the responses of motile and sessile organisms. In the former the most striking responses are changes in position, in sessile animals changes in structure and form are more prominent. In feeding motile animals are more restricted than at other times, while in sessile animals this is not the case, and the dispersal of spores, seeds, and other reproductive bodies serves to spread the species. On this account motile organisms are a better index as to whether conditions are favorable, but sessile organisms are more important as causes of succession, since they effect the surrounding medium more with waste products, skeletons, etc.

The animals of pond and rapids communities differ in their general reactions, according to Shelford (37), but within each community there is an agreement. Pond animals react best to a current of low intensity while those of the rapids prefer a stronger current. Animals of the same community but found at different levels exhibit specific peculiarities, as in their reaction to mud, sand and stone bottoms. Animals living beneath stones show a preference for weak light, those on stones, medium light, and those among stones, strong light.

Shelford (38) has studied the behavior of several terrestrial amphibians and arthropods to air of high evaporating power. Certain of these animals quickly acquired the ability to go to the parts of the experimental cage where the evaporation was least. Some showed increased sensibility with successive trials, and the writer believes this is probably "due to some disturbance in neutrality brought about by concentration" of body fluids. He also states, "there is no reason to assume that associative memory is essentially different or stands apart from the type of modification here described." "It is, therefore, a fairly safe assumption that the capacity to avoid disadvantageous, and the capacity for advantageous, modification are innate also."

Shelford and Allee (39) report the results of experiments to test the behavior of fish in water containing various substances. "Most of the fishes studied reacted negatively to various concentrations of carbon dioxide; to little oxygen; to boiled water with the removed oxygen restored; and to boiled water with acetic acid or carbon dioxide added. The behavior of the fishes when giving a negative reaction usually possessed prominent features. They tried the modified water a number of times and then began to turn back in lower and lower concentrations of the gradient or to spend shorter and shorter time in the modified water with each visit. The response was rhythmical rather than cumulative," but fishes soon learned to avoid the end of the tank where conditions were unfavorable, and when they did enter the modified water remained for shorter periods of time. "The fishes undoubtedly sense the solutes upon entering them." The writers believe that increased sensibility is due to increased tissue acidity. Advantageous reactions are apparently confined to stimuli encountered in everyday life and there is therefore correlation between the conditions of existence and types of irritability. The increased sensibility after repeated stimulation is not believed to be due to associative memory.

Simroth (40) describes his observations on marine gastropods. Colors depend upon pigment, uric acid, and calcium deposits. They frequently serve for warning or protection. Gastropods have many methods of locomotion—through changes of blood, pulsation, swelling, waving lateral parapodia, or gills, etc. Some throw off the gills and dermal processes when molested.

The habits of herring gulls are described and illustrated by Strong (41). These birds nest in large flocks in uninhabited places, particularly islands. They are omnivorous feeders, and hence good scavengers. The breeding season is from the first of May to August. The parents take turns guarding the nest and are ready to fight anything that comes near. Young birds are fed with partially digested food disgorged by the parents. The gulls make a variety of sounds including the alarm cry, the challenge, and the "mewing" for the young. They are easily frightened by sounds, and are sensitive to changes in temperature. They react positively to currents of air. Gulls probably rest during the night except in the breeding season or when food is especially abundant. Their behavior shows some modifiability.

Szymanski (42) has studied the average time of rest and activity of several animals for twenty-four-hour periods. Cockroaches rested during the day and were active from seven to ten hours at night. Goldfish were active mostly during the day. A salamander remained perfectly inactive from November to January. A canary had about the same periods of quiet and activity as man. A white mouse showed sixteen active and rest periods during a day; a gray mouse, nineteen of each.

Vestal (43) in his excellent paper on terrestrial associations points out that ecologically "the characters of plants may be classed as structural, physiological, biographical and numerical. Animals have in addition, behavior or psychological characters."

Wheeler (44) calls attention to a number of points in the behavior of cockroaches, bees, ants, etc., which make them good vehicles for carrying human diseases.

Miss White (45) has studied the reactions of brook trout from the time of hatching until the yolk sac is absorbed. Soon after leaving the eggs the young fish are positively rheotropic and negatively phototropic; light being a more potent stimulus than current. An excess of carbon dioxide in the water causes a rapid swimming without reference to light. Shadows cause no response until the fifth week after hatching and feeding commences at about two months. Sight is the most important sense in learning to feed.

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RECENT LITERATURE ON SENSORY DISCRIMINATION IN ANIMALS

BY K. S. LASHLEY

Johns Hopkins University

To judge from the relative numbers of studies of sensory phenomena in animals, the chief interest at present is in the field of light reactions with auditory, olfactory, and tactual sensibility next in order. But one study of the temperature sense and none dealing directly with organic sensation have appeared during the past year.

Touch.—In an extensive study of the function of the vibrissæ in the white rat Vincent (30) finds that the ordinary maze offers little occasion for the use of these organs. In a maze without sides the vibrissæ give the animal orientation with respect to the edges and corners of the maze. At turns they serve as the source of stimuli releasing the kinæsthetic-motor habits of direction. For tactual discrimination a three-alley discrimination box was used, so arranged that any one of the alleys could be fitted with corrugated walls while the other two remained smooth. Normal rats learned quickly to choose the rough surfaces, those lacking vibrissæ learned with greater difficulty, and rats lacking cutaneous sensitivity in the nose, as the result of section of the infra-orbital nerve, failed to learn the problem.

Ackert (1) describes a number of sensory end-organs in the integument of the bat.

Morgulis (22) gives a brief statement of the objective psychology of Pawlow. A number of recent papers from Pawlow's laboratory are reviewed. Only one of these deals directly with sensory acuity. Vassiljev established conditioned salivary reflexes to heat and cold in the dog. It was easy to get responses to these stimuli but they were differentiated only with difficulty. This suggests a close interrelation of the conduction paths (centers) for cold and heat.

Auditory and Allied Functions.—Owing to the difficulty of removing the otocysts of the Gastropods, the result of the close anatomical relations of these organs to the pedal ganglion, Baunacke (2) attacked the problem of their function by a process of elimination of other sense organs in reactions to gravity. The snails studied, genera *Helix*, *Arion*, and *Limax*, give two types of reaction to

gravity; they right themselves when turned on the dorsal side and, when immersed in water, migrate from the bottom to the surface film by crawling up the sides of the vessel. Stimuli of light, touch, pressure and the chemical sense were controlled. Operative methods showed that the presence of the ganglionic ring and the otocysts is necessary for orientation to gravity. Baunacke holds that these experiments limit the stimulus for reaction to gravity to the otocysts. Like evidence is advanced to show that the otocysts function in the righting reaction. The method seems to fail to distinguish between otocyst function and other organic sensations of weight.

Rothfeld (25), by severing the neck muscles of the rabbit in order to control the relative position of head and body, has shown that after stimulation of the vestibular apparatus by rotation the type of reaction, as exhibited by increased tonus of the muscles of the back and limbs, is dependent upon the position of the head. The movements of the animals, after rotation with the head in the normal position, change with changes in the position of the head and correspond closely with those described for man with the head in like relative positions to the body.

Turner and Schwarz (29) report a field study of the reactions to sound of moths of the genus *Catocala*. Some species show instinctive reactions to sounds of high pitch but none gives a reaction to those of lower pitch (256 v.s.). The stimulus was given to the moths resting upon tree-trunks by one experimenter standing behind the tree, the other observing the actions of the moths from a distance. To the Galton whistle the moths react by vibrating the wings or taking flight. To low-pitched sounds they give no response, but when the stimulus has been followed a few times by tactual stimulation the moths learn to respond to the sounds by taking flight.

These results have been confirmed and extended by Turner (28) in a study of silkworm moths confined in the laboratory. The moths were handled roughly after stimulation with sound waves and so were trained to react by vibrating the wings to sounds varying from 64 to 9,290 v.s.

Forbes and Sherrington (7) experimented upon the auditory reactions of a number of cats from which the entire cerebrum and the basic ganglia in front of the anterior colliculi had been removed. From one to four hours after the operations the animals were stimulated with various sounds, whistling, high-pitched Quincke

tubes, barking of a dog, imitation of the same, metallic sounds, shouting, etc. In response to these sounds retraction of the pinna, turning of the head, flexion and extension of the limbs, and lashing of the tail were observed, occurring together or separately. There is some evidence of differential response to the different sorts of stimuli; barking excited more pronounced reactions than metallic sounds or whistling. The movements of the head and pinna are interpreted as orientation reflexes serving to locate the sound. The lashing of the tail was one of the most characteristic and persistent of the responses. It is regarded as a pseudo-affective reflex, "the mimesis although normally concomitant with the emotion of anger was in these experiments exhibited in the absence of the emotion itself."

Shepherd (26) tested two cats for discrimination of pitch and intensity of sounds. The cats were to react by climbing or looking up to the top of their cage for food at the positive stimulus and to inhibit movement at the negative. Notes were sounded on harmonica and piano. On the former the animals discriminated one octave, on the latter two. No attempt was made to determine the difference limen more closely than this. The noise of a stick striking a sounding box with controllable force was used as the stimulus for intensity. The cats learned to distinguish sounds of different intensity. The time required for the formation of this habit was less than that of the raccoons and monkeys previously studied by the same method.

Hunter (15) records experiments showing sensitivity of the white rat to clangs of different character and its ability to distinguish clangs from pure tones. Further experiments indicated that the rat is insensitive to pure tones between 341.3 and 2,048 v.s. Sensitivity to sounds of very high pitch from the Galton whistle was tested by observing the instinctive reactions of the rats to sounds. To high-pitched pure tones no unequivocal reaction was seen. On the basis of the failure of the rats to react to pure tones Hunter suggests that audition may be found to be divided into sensitivity to clangs and pure tones just as vision may be divided into brightness and color vision. To the reviewer it seems that the response to the high overtones of the clangs has not been eliminated by these experiments. Hunter does not state the ages of the rats tested with the Galton whistle. It has been the reviewer's experience that only very young rats or rats under strychnine react readily to clangs or high-pitched tones of low intensity.

A study of the sensitivity of the dog to rhythm, reported by Usiewitch, is reviewed by Morgulis (21). A dog was trained to react, by the secretion of saliva, to the beats of a metronome oscillating 100 times per minute. After training, each stimulation called forth from six to ten drops of saliva. Change of the rate of beat to 96 or 104 per minute was followed by a cessation of the reaction. The differentiation of these slight intervals persists for 18 hours but vanishes completely after 45. After preliminary training a differentiated stimulus first depresses the salivary flow: this is followed by an increase for the next few trials and then a final complete disappearance.

Olfactory Sensitivity.—Risser (24) tested the olfactory sense of toads and tadpoles. Adult toads showed no choice of food on the basis of odor. An air current containing odorous substances was directed to the nostrils. To food odors the animals gave no reaction; to volatile oils and alcohols they reacted by turning away or bending down the head. Toads with the olfactory tracts sectioned did not react to these odors, those with severed ophthalmic branch of the fifth nerve, which supplies the lips and perhaps part of the nasal capsule, reacted normally. Normal tadpoles gathered around packets of food; those with the anterior nares filled with vaseline did not react to the food packets.

Polimanti (23) recorded the number of males and females of the moth *Bombyx mori* which, after emerging, were attracted to and alighted upon other cocoons. Data are given which indicate either that the sense of smell is not well developed in these moths, or that the cocoon membrane effectively prevents the diffusion of smell substances.

Johnson (16) summarizes three possible explanations of the dog's ability to follow a trail without back-tracking. The assumption that the dog follows the trail in the same direction as the quarry because the more recently made tracks have the more intense odor is subject to the objection that the rate of diffusion of smell substances varies with the nature of the ground, and the intensity with the relative speed of the dog and quarry. Other theories assume either an accurate perception of the form of the tracks or the reaction to the combination of the odor of the quarry with the smell substances taken up from the ground and carried along for short distances.

Vision.—Ewald (6) finds that for the lateral orientation of *Daphnia* like volumes of light have like effects whether given

intermittently or continuously while for the sense of the reaction, positive or negative, the interrupted light is the more efficient. Specifically different effects are produced by waves from opposite ends of the spectrum. Some evidence of simultaneous and successive contrast is advanced and the attempt is made to differentiate the eye into a central portion sensitive to color and controlling the sense of reaction, and a peripheral portion, color-blind and controlling the orientation.

The appearance of an eyeless individual in his cultures of *Daphnia* lead Herwerden (11) to investigate the sensitivity of *Daphnia* to ultra-violet rays. The results show that the eye is the receptor for these rays.

F. W. G. (9) reviews briefly the work of Frisch and Kupelwieser and raises a point of credit.

Hess (13) finds that the tube-feet of Astropecten are insensitive to red light and sensitive to green. The sensitivity is increased by darkness adaptation. *Holothuria poli* shows a like sensitivity by the contraction of its tentacles. In sea urchins of the genus *Centrostephanus* the spicules surrounding the anus show reactions to light. They are markedly insensitive to red and respond readily to shorter wave-lengths. Their sensitivity to reduction in intensity is equal to that of man. Hess concludes that all these forms are insensitive to wave-length. Tube worms (Serpula) contract with reduction of light intensity. By shifting from one part of the spectrum to another Hess (12) determined that the point of greatest stimulating value for them lies in the region of the yellow-green to green and that the stimulating value decreases more rapidly toward the red than toward the blue. Similar results were obtained with barnacles.

Frisch (8) advances evidence for a differentiation of the long and short waves of the spectrum in the bee. Color papers were used but in response to the criticisms of Hess and others the possible secondary criteria of odor, relative brightness, absolute brightness, differences in the surfaces of the paper, and chance grouping of the bees were, with the possible exception of the paper texture, thoroughly controlled. The positive color papers were varnished without breaking down the bee's reactions. It would be interesting to know whether a like procedure would lead to a temporary confusion of the cats studied by De Voss and Ganson (5). The bees confused red with black and did not distinguish a certain blue-green from gray. Orange and yellow are not clearly distinguished from

green and the shorter wave-lengths are confused with blue. Bees were trained to distinguish patterns roughly imitating flower patterns and were able to discriminate upon the basis of form as well as of color. When patterns quite unlike natural flower patterns were used the bees failed to make the discrimination.

Hindle (14) painted a piece of cardboard with stripes of different colors, covered the whole with transparent sticky paper, and recorded the number of flies caught upon each color. There was no preference for any color or even for black or white.

Haempel and Kolmer (10) present an interesting paper on chromotropin in dace (*Phoxinus levis*) and sculpins (*Cottus gobio*).

Laurens (20) studied the reactions of tadpoles of *Rana* and *Amblystoma* to light. The frog larvæ, both normal and eyeless, were indifferent to light. Salamander larvæ were sensitive, the great majority being photo-positive. Individuals from which the eyes had been removed were almost as sensitive and positive as normal ones.

Hunter's discussion of form and pattern perception has called forth replies from Johnson and from Bingham. Johnson (17) points out that the method of control suggested by Hunter, the use of alleyways of different forms in the discrimination box, would lead to secondary disturbances in the animals' reactions and, further, doubts the necessity for any control since the background of the stimulus plates is altered by the reversal of their positions.

Bingham (3) recognizes the distinction between pattern and form and distinguishes also the element of "shape." As the reviewer understands this terminology it is based upon three problems: (1) Can the organism give a differential reaction to diverse groups of retinal stimuli (pattern vision); (2) can it give uniform reactions to a constant element common to diverse groups of retinal stimuli (shape perception); (3) can it give uniform reactions to the constant characters of a variable element, as three-sidedness of diverse triangles (form perception).

Tugman (27) gives data upon the threshold of brightness discrimination in the English sparrow, using the Yerkes-Watson brightness apparatus. With one stimulus plate having a luminous intensity of .098 Hefner unit, the other less, the least discriminable difference was, for three birds, .015, .022, and .035 H.U. Under the same conditions the human threshold varied from .009 to .013 H.U.

Coburn (4) finds that the crow is able to distinguish differences

of brightness, size, and form. No attempt was made to determine the difference thresholds.

Johnson (18) outlines a number of problems of visual acuity in animals; the stimulus threshold for striations, the difference threshold for size of striations and direction of visible striæ, and the threshold for brightness contrast. The use of form plates for the study of visual acuity has proved very unsatisfactory owing to the difficulty of controlling the degree of similarity of the plates. Johnson describes apparatus which offers a much more accurate and convenient means of testing acuity. Crossed ruled gratings in especially designed mounts are substituted for the stimulus plates in the Yerkes-Watson discrimination apparatus. These give fields striated alternately black and white, the width and direction of the striæ being varied at will. For tests of brightness discrimination Johnson proposes the use of paired Lummer-Brodhun prisms, each transmitting alternate bands of light from two variable sources.

Using the crossed gratings Johnson studied the visual acuity of the dog, monkey, and fowl, comparing the results with those obtained for man under like conditions. The dog gave no certain result; he was able to recognize the charged punishment grill, probably from the odor of the ozone produced. The thresholds for the other subjects were, in terms of the visual angle subtended by the least visible striæ; monkey, $0' 57''$; chick No. 1, $4' 04''$; chick No. 2, $4' 14''$. The average acuity of four human subjects was $0' 49''$.

Yerkes and Eisenberg (31) trained ring doves to choose the brighter of two lights, then offered them a choice of spectral red and green of approximately equal energy. Twenty trials were given each of two doves light adapted, and the same number after darkness adaptation. Dark adapted, the doves showed a slightly greater preference for the green than when light adapted. This indicates a Purkinje effect of adaptation in these birds. The male dove was somewhat more sensitive to red than the female.

The action currents of the retina under stimulation with light of different wave-lengths give further data upon color vision in birds. Kohlrausch and Brossa (19) studied the action currents of the eyes of small, twilight-flying owls under curare. The eye, dark adapted, was stimulated with light of low intensity from a Nernst projection lamp. Filters transmitting 713-622, 600-540, and 486-414 $\mu\mu$ were interposed and the intensity of the light

regulated until a standard galvanometer deflection was produced. Under these conditions deflections of almost identical form were obtained with all the filters. No differential action of wave-length independent of intensity is demonstrable by the action current. Similar experiments were carried out with light adapted pigeons with higher light intensities. Different galvanometer deflections were obtained with the three filters and the form of the deflection curve remained characteristically distinct for each filter at all light intensities.

The extensive and careful experiments of De Voss and Ganson (5) show how little trust can be placed in positive results on color vision obtained by the use of color papers. The cats were trained to distinguish Bradley colors from Hering gray papers. They were then tested with other grays and found to distinguish the colors from all the grays of the series. Grays of different texture were next tried and finally a gray cambric was found for each color which the cats could not distinguish from the color after 600 trials. They failed to distinguish any color from all shades of gray. A comparison of the brightness values of the grays confused with the colors indicates that red, blue, and violet have low stimulating value for the cat. The color papers were compared and the cats confused those of low stimulating value in one group, and those of higher stimulating value, yellow and green, in another. The work gives almost certain evidence that cats are color blind.

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RECENT LITERATURE ON HABIT FORMATION, IMITATION, AND HIGHER CAPACITIES IN ANIMALS

BY JOHN F. SHEPARD

University of Michigan

During the first part of the year 1914 we find descriptions of equipment which has been used in several pieces of work published since. Yerkes and Kellogg (26) describe four types of apparatus for obtaining graphic records of the movements of an animal in a maze. Watson (22) describes a circular maze with which one of the graphic methods mentioned above is used.

The development of the fourth floor of Emerson Hall into a laboratory of ten rooms for animal psychology and the establishment of a field station at Franklin, New Hampshire, for both naturalistic and laboratory investigations (26) are important events in the history of the science in this country.

One of the studies carried out at Franklin Station was on the crow (3 and 4). This animal learned to discriminate differences in size of the stimulus regardless of relative intensity, and to react to relative size instead of merely to a specific stimulus. In the second part of the work, the Yerkes multiple-choice method was used. This consists of a series of reaction units, of which, at any given time, one unit will give food or other satisfaction when properly reacted to. This unit is determined by some special relationship of itself to the other units, which basis of determination is to be learned by the animal. Out of the total number of units available, ten different settings or combinations having each three to nine units were used in rotation. In the use of these combinations, the work of each experiment period began where the work of the previous experiment period ceased. Three problems were given to the crow as follows: (1) Selection of the unit first at the right of the series or combination used; (2) selection of the unit second at the left; (3) selection of the unit first at the left. In each case it is necessary to separate the constant relation from the variable accompaniments. One male crow and one female crow were tested. Both solved the first and third problems in from fifty to one hundred trials. Both failed to solve the second problem in five hundred trials. In dealing with the second problem, long periods of correct choices followed by sudden decrease indicate the "trying out" of various reactive tendencies, none of which proved more than partially satisfactory.

Another of the studies carried out by the multiple-choice method was that by Yerkes and Coburn (25) on the pig. The results indicate to the authors an approach to "free ideas" in the pig, although visual and kinæsthetic factors in the main determine its responses. The pig is more independent of the particular situation than is the crow. The multiple-choice method has fully justified itself. It is believed that by means of a series of problems of varying difficulty, the levels of mental development of different individuals, species, etc., can be determined.

In experiments on inbreeding conducted at the Wistar Institute, a strain of albino rats was produced in which the relative brain weights were less than normal. Basset (1) gives data which indicate that this decreased relative brain weight was accompanied by a correspondingly decreased ability to form habits. The Watson circular maze and two inclined plane experiments were used in the tests.

Miss Vincent, in her study of visual control with rats (18), used a maze in which the true path was entirely white, while all cul-de-sacs were black, one in which the true path was black and the cul-de-sacs white, and a normal maze for control. Discrimination was also tested by use of a box having two cylindrical bent tubes placed on opposite sides at floor level as exits. One of these tubes was white inside, the other black; and only the one for which the animal was being trained was left open at the outer end. The animals showed greater accuracy, and, because of accuracy, a shorter time in the early trials in the black and white mazes than in the normal. On the other hand, the contrast of brightness acted as a distraction at times, caused the persistence of a certain degree of error and slow time, and interfered with automatism. Blind rats in the black and white mazes show learning curves similar to those of the normal maze. Normal rats that had worked in the black and white mazes learned the problem box in less trials on account of their experience in the maze.

In the study of olfactory control (19) the maze was well covered with enamel paint, and a paper strip was laid over the bottom of the maze in all alleys. In one experiment an olfactory trail was rubbed along the strip in the true pathway only; in a second experiment it was put in the cul-de-sacs only. In both these tests, the number of errors was decreased compared with a normal maze, more so in the first experiment than in the second. Speed, however, was slow. When the paper was removed from the alleys, the rats ran the maze

as usual, showing that the habit had become kinæsthetic. The rats were then transferred to a problem box in which the kinæsthetic was ruled out, and in which two tubes were presented, one lined with clean paper, the other taken from the maze and carrying the trail. The rats which had been used in the first maze (trail in the true path) followed the scented paper from the maze; those which had been used in the second maze followed the other tube.

In a third paper (20) Miss Vincent used a maze with removable sides, where the alleys were so far apart and elevated that the animal would not jump across when the sides were removed. If the sides were removed after the maze was learned, it had to be in great part relearned. The method of learning when the sides were down showed the importance of the vibrissæ and the tactual sensations from nose and feet.

Szymanski (17) used a box in which the choice at one point should depend primarily upon kinæsthetic factors, at another point upon visual brightness. Rats formed associations on the basis of kinæsthetic factors much more easily than in terms of optical stimuli.

According to Shepherd (16) monkeys promptly pulled food toward the cage by means of a stick to which it was attached, and showed other similar adaptations while dogs and cats failed under analogous conditions. While the difference may be partly due to the superior motor equipment of the primates, the author thinks the monkeys are also much superior in "adaptive intelligence."

Hunter in a reply (9) to Watson's criticisms, shows that in his experiments there was no "error of observation," that there could be no constantly maintained attitudes in the racoons, and that the temperature and odor stimuli were sufficiently controlled to make his deductions valid. He believes that if we are to get at the genesis of the idea function, we shall do it by a study of the delayed reaction.

Schwartz and Safir (15) aimed to determine (1) whether the fiddler crabs can form a simple labyrinth habit, (2) whether the habit is retained for a few days, and (3) whether the habit can be broken up. When the crabs were placed in a box partly full of moist sand, they would at once attempt to escape. They would run to the opposite side of the box and it was noted that nearly all individuals turned toward the right or left corner in their flights. The tendency to escape is so strong that, if brought back time after time, they will make a large number of trials in succession. To

test learning, an individual was released from a triangular enclosure at the center of one side, the distant corner toward which he tended to move was stopped and the other distant corner was made to open into an enclosure containing the animal's burrows. At first the crab slowly and by accident found his way from the closed corner to the open. With repeated trials, the tendency was gradually set up to go more and more directly from the releasing point to the open corner. This new habit persisted after ten days. If the closed corner were then opened and the open corner closed, the habit could be reversed, but the process was slow and gradual. Any establishment of a pathway was prevented by scraping off the top layer of the substratum or by adding a fresh one.

Edinger's work (5) is offered as a suggestion of the method by which, before a laboratory investigation is begun, the animal's "mental status" should be taken by careful observation of his daily activities. Material of some value is included, such as the dog's understanding of specific words and commands, his lack of insight in applying these to new situations, his tendency to do a thing once taught in a given situation whenever that situation presents itself.

Miss Hubbert (8) worked with the circular maze and graphic recording apparatus described by Watson. She recorded the total time required and the total distance run during each trial with twenty-seven rats until the habit was established in each, and then compared the resultant time and distance curves for all the rats combined. The similarity between the two curves was striking. She maintains that it is feasible and desirable to obtain both a time curve and a distance curve, and that it is impossible to "state which is the better criterion of learning. We are sadly in need of a close analysis of just what the time and distance curves mean."

The same writer (7) discusses the order of dropping errors in the maze. According to the pleasure-pain theory, errors should be eliminated progressively backwards from the cause of the satisfaction, the food-box. Her work is based on the Watson maze again. A tabulation of her results shows only a very few cases in which there is uniformly progressive elimination of the errors backwards, and only a small per cent. in which the errors in the latter half are dropped before those in the first half.

Pleasure-pain is rather generally regarded as the selective principle in learning. Carr (2) offers another suggestion. The animal responds to a situation as a complex series of stimuli. His

action in turn modifies the stimulus and the stimulus changes from trial to trial. Elimination in this process is only a matter of selection of something else; selection is a matter of emphasis. The factors which emphasize the successful act are relative frequency, intensity and recency. In a problem box, the successful act must occur every trial, while a useless act would naturally occur in only half the trials, although at times an error may occur more frequently than the correct act. The successful act is emphasized by its sensory consequences, the fact that the locks, etc., move, that food results. The successful act is the final one, and is therefore not affected by retroactive inhibition. In the maze, according to Carr, a blind alley will be traversed only half as often as the adjacent true path; and while the true path encourages freedom, continuity and rapidity of movement, the cul-de-sac means "hesitation, caution, investigation, or disastrous sensory consequences." Hence the greater frequency and intensity of the successful act.

Papers by Haenel (6), Gruber, Ricciarelli, Ferrari, and many others in *Tierseele*, give much the same reports as formerly in regard to the trained horses and dogs of Krall, Frau Moekel, and others. v. Máday (11 and 12) and Schröder (14) protest against the interpretations of Krall and his followers.

Sanford reviews (13) the performances of the trained horses and the findings of Pfungst. Krall, he thinks, has given altogether too little serious attention to tests "without knowledge." Krall maintains that the erratic spelling of the horses indicates independence in thought; but the pure blundering and inaccuracy of the control would give just this result. The horse was unable to respond to simple problems on cards, while he would follow much more complex ones on the blackboard. Sanford remarks that "creatures with such small powers of dissociation (since dissociation is an essential factor in the formation of abstract conceptions)" could never have grasped the abstract relation of the number system. The methods and conditions of work on these animals, and the interpretations growing out of the results are similar to the methods and results of the investigations of the Society for Psychological Research into human experiences.

Volkelt (21) is concerned with the objective or cognitive side of animal consciousness, and would inquire how the objects of the environment appear to an animal. To determine this, he would study cases in which an object has definite value and interest to an animal (such as food, home, etc.), and yet the animal fails to

adapt to it properly. It must be certain that the animal is in condition to have a real "interest" in the object, and that in a different total situation he would respond with adaptive behavior. A summary of Volkelt's work with apt critical comments is given by Hunter (10).

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SPECIAL REVIEWS

The Lyriform Organs and Tactile Hairs of Araneads. N. E. McINDOO. *Proc. Acad. Nat. Sci. Phila.*, 1911. Pp. 43. *The Olfactory Sense of the Honey Bee.* N. E. McINDOO. *Jour. Exp. Zool.*, 1914. Pp. 81. *The Olfactory Sense of Hymenoptera.* N. E. McINDOO. *Proc. Acad. Nat. Sci. Phila.*, 1914. Pp. 47. *The Olfactory Sense of Insects.* N. E. McINDOO. *Smithsonian Misc. Coll.*, No. 2315, 1914. Pp. 63.

The papers listed above present the results of about five years of intensive study upon the olfactory sense of certain hymenopterous insects and spiders. The last paper of the series gives not only a resumé of McIndoo's own researches, but also useful reviews of the observations and conclusions of other workers in this field. Its comprehensiveness is indicated by the number of titles listed, one hundred and sixty-four in all, of which but fifteen were not directly accessible.

McIndoo shows from both morphological and experimental data that the so-called "lyriform" organs are the true olfactory structures of the araneads. Thirty-nine species, representing twenty-seven families, were examined. A lyriform organ is usually composed of several slit-like apertures in the cuticle bounded externally by a lyre-shaped, pigmented border. At the base of each slit lies the peripheral end of a sensory fiber. Lyriform organs are found upon all of the appendages and in certain other locations. Tested spiders make distinct responses to the odors of essential oils, but when the lyriform organs are smeared with vaseline the spiders respond nine times more slowly.

In the leading article of the series McIndoo investigates the sense of smell in the honey bee with particular reference to the

structure and disposition of the sensory organs involved. Crucial tests with odors of essential oils (peppermint, wintergreen, thyme, etc.) and with other substances demonstrate the olfactory capabilities of this insect. Bees under experiment were placed in small cases with glass tops and cheese-cloth bottoms, and the odor was presented by quickly uncorking a small vial containing the odoriferous substance and holding it beneath the individual bee. The reaction time was taken in seconds. As is well known, the antennæ of insects are usually designated as the bearers of olfactory receptors and the current antennæ-odor theory is largely based upon data obtained by mutilation methods. As might be expected, injuries to the antennæ of bees are followed by slower reactions to odors, but McIndoo concludes that retardation of response results primarily from the shock of mutilation rather than from direct injury to olfactory structures. Covering antennæ with glue and burning them off is less injurious than amputation although bees so treated are evidently somewhat abnormal. However, they retain the ability to receive odor stimuli for the average reaction time of worker bees with antennæ burned off is 4 seconds as compared with 2.64 seconds for unmutilated bees. Numerous experiments similar to the above lead McIndoo to reject the idea that the antennæ of the honey bee receive olfactory stimuli.

Sense organs of several types are found upon the antennæ but to none of them does McIndoo assign an olfactory function. In his opinion certain other structures, the "olfactory pores," are the true organs of smell in the bee, and probably in other insects. Similar sense organs were first noted by Hicks (1857-1860) in various insects. McIndoo finds that the olfactory pores of the bee are grouped upon the bases of the wings, upon all of the legs and scattered over parts of the sting. None are found upon the antennæ. In the very extensive experimental work presented in proof of the olfactory function of these pores it is shown that reaction times to odor are greatly lengthened (eight to twelve times) when the pores are covered with a beeswax-vaseline mixture although behavior is normal in all other respects. A correlation is also established between the number of pores characteristic of each cast and the relative sensitivity of the cast.

In the third paper of the series McIndoo shows that olfactory pores of like structure and location to those of the honey bee are found in 29 species representing 22 families of the Hymenoptera. Experimental work upon *Formica obscuriventris*, *Camponotus penn-*

sylvanicus and *Vestula maculata* yields results comparable to those obtained with the bee. McIndoo attempts to calculate the relative sensitivity of different species upon the basis of the number of pores present, but an exact evaluation of this relation would seem difficult.

In making a survey of the above papers one is impressed with the painstaking manner in which the work has been conducted, with the variety and ingenuity of the tests employed and, in the case of the honey bee more particularly, with the sound basis of facts from which conclusions are drawn. It would seem well established that the olfactory organs of this insect are the "olfactory pores" and that they are not located upon the antennæ. There can also be little doubt of the presence of similar organs in similar locations on the bodies of the other Hymenoptera studied. Here also experimental results indicate that the antennæ play little or no part in olfactory sensation although the statement that "a few antennæ" (from the 29 species studied) "were hurriedly examined" leaves doubt as to whether or not the organs of Hicks are entirely absent from these structures. It should further be noted that although the olfactory pores may be the "true olfactory apparatus in Hymenoptera" and "the antennæ play no part in receiving odor stimuli" it may yet be doubted if an equally sweeping generalization should be made to include all insects. McIndoo does not hesitate to predict that "when the behavior of insects investigated is thoroughly studied and when experiments are performed in ways other than on the antennæ alone . . . it will be realized that the antennæ can no longer be regarded even as a possible seat of the sense of smell in insects." Such indeed may be the case, but extensive and equally excellent investigations upon other orders will be necessary before this interesting supposition is either established or rejected.

D. B. CASTEEL

UNIVERSITY OF TEXAS

Behavior, An Introduction to Comparative Psychology. J. B. WATSON. New York: Holt & Co. 1914.

This book has been written as a text for students and is to be evaluated in this light. The best organization of any material for the use of students is always a problem, especially in a relatively new subject. As a consequence, the text will probably not meet the entire approval of any teacher, the author himself not excepted.

With a few exceptions the book is simply, concisely and clearly written. It contains three useful chapters not found in such texts: Chapter III gives a good summary of typical kinds of apparatus and methods, material which is difficult to present in class and which the student has been compelled to gather from the various sources. Chapter V gives a good and interesting presentation of the later biological material on the origin of instinct, which should be very useful to all students of psychology without an adequate biological training. Chapter IX deals with the recent work on animal prodigies. The statement, analysis and evaluation of results here given are excellent. The more conventional factual material of comparative psychology is found in the eight chapters on instinct, habit and the senses. Watson is at his best in the summaries, analyses and generalizations of factual material; the treatment is on the whole critical, careful, conservative and free from dogmatism. Some readers may dissent from the overemphasis of the higher animals and the omission of any treatment of the lower organisms, but the author may reply that selection of material is necessary in a book other than a treatise and that he is primarily dealing with types of behavior, and not with animals.

It is in point of view, theory and interpretation that the work will receive the most criticism. As is well known, Watson's point of view is that of "behaviorism" and the first chapter is devoted to an exposition of this doctrine for both human and animal psychology. To the reviewer's mind, "objectivism" is a better term. Watson deals not only with behavior but with the analysis of the sensory situation and the sensory conditions of response, as is well attested by the last four excellent chapters. Furthermore, behavior in the human can be studied by the subjective method, and the term does not differentiate Watson's position from that of some human psychologists who call themselves behaviorists. The essential of Watson's position is not a distinction of subject matter (behavior), but the objective point of view from which it is studied. The larger part of the chapter is devoted to upholding the exclusive use of the objective method in human psychology. This extension of the doctrine to the human realm is out of place in a text on animal psychology. The questions at issue are radically different in the two cases. In the human realm the problem concerns the validity of *introspection* as a means of obtaining data, while in the animal field we are concerned with the validity of an *anthropomorphic interpretation* of factual material. It is easily conceivable for one

to adopt Watson's position in animal psychology and reject it in the human field. The diversion is thus a waste of space and is extremely likely to confuse the issue in the student's mind. One also might wish in a text for students a more impersonal presentation of the various points of view rather than what one may well term a propagandist treatment of the author's attitude. Concerning the rejection of the introspective method, two remarks are appropriate. There is some moral certainty that at least one of the author's pet and fundamental doctrines was attained by this very method, viz., the exclusively motor basis of thought. One may also maintain that introspection is surreptitiously introduced into the system by the use of the "language method." In animals we interpret an act in reference to the animal and the objective situation; with the language report, we cease to regard the response wholly in relation to the objective situation, but we interpret its significance in reference to our own experience subjectively regarded.

In the animal realm, Watson's negative position contends that the objective data shall not be organized and interpreted in reference to determining the conscious states of animals, yet the facts need organization and principles of interpretation, and I do not find Watson's positive program to be very clear in this respect. Like other sciences, the goal of behaviorism is the prediction and control of its phenomena, but with the other sciences this aim is not the final goal for it is prosecuted with the hope of ultimate service to human needs. Prediction and control of animal behavior might be of service to animal trainers and those dealing with domestic animals, or this human service would be rendered if we frankly regard the purpose of animal psychology as a phylogenetic mode of approach to the analysis and comprehension of human intelligent activity. Watson makes statements which can be interpreted in support of both possibilities. On the one hand, all anthropomorphic interpretations and comparisons are anathema, the behavior of amœbæ has a value in and of itself without reference to the behavior of man, and the biologist no more studies animals in reference to the origin and development of the human race. On the other hand, correlation is necessary and one type of correlation demanded is the ontogeny and *phylogeny* of behavior, learning in animals is probably the most important study of behavior on account of its bearing upon human training, and the lack of language differentiates the brute from man. His material is actually organized under the three topics of instinct, habit, and the senses, and I did

not find any satisfactory treatment of the mutual relations of these three divisions in respect to a unitary scheme.

In the chapter on language we have the old question of the existence of ideas, images and thought in animals dressed up in new clothes, so new in fact that the discussion and the bibliography contain no reference to other literature on this topic. In Watson's system, there are no images and what we generally term ideas and thought are merely language habits. Language is considered merely as thought and not in the sense of communication. Not all vocal habits are language, and bodily habits may function as language. The distinction between language habits (thought activities) and other acts is one of function in the objective situation, and the criterion urged is "adaptive substitution." No activities of animals can subserve this function and hence language or thought is absent in animals. It makes no difference whether we call a thought activity, an idea, a memory process, an image, or a language habit, we are dealing with the same old problem of an objective criterion by means of which we can determine the presence or absence of these activities in animal behavior, and other writers to my mind have advanced exactly this same criterion of adaptive substitution. Cole urges the criterion of "varying means to the same end" as one evidence in favor of the existence of ideas in animals, while Hunter reiterates again and again that vicarious substitution is one of the essential functions which a "memory idea" must subserve. The reviewer has no quarrel with the validity of the criteria urged but questions their sufficiency and adequacy, for on this basis I would conclude, contrary to Watson, that all animals possess language or thought.

Objection may be registered to the omission of "sensory consequences" as one of the principles of selection and elimination. The question may best be reserved for experimental decision, though attention may be directed to the fact that Watson favors the use of the consequent of punishment (electric shock) as an eliminative agency.

The treatment of reflex, instinct and habit contains much that is commendable as well as several doctrines which are likely to meet with dissent. All sensory-motor connections (reflex) are hereditary and innate; the only novel acquired factor added by experience is an increase of functional strength due to frequency and recency of activity. We are told that the number of reflexes can not be increased or decreased, no new connections are acquired, all neural channels are preformed, all associations or bonds are given in hered-

ity, and all modification due to learning results from an increase of strength of certain reflexes relative to others. The author comes perilously near to contradicting this conception in his later doctrine of substitution, for we are there informed that a stimulus which originally did not call out a given response comes later to elicit it. Certainly, many coöordinations are elicited only because of the exigencies of experimental conditions and the assertion that these are nevertheless due to heredity rather than to experience is somewhat dogmatic. To my mind the author is here using the term "preformed" in the sense of "determined" rather than with the usual meaning of a congenital mode of determination. Habit and instinct refer to a series of reflexes in which the sensory stimulus of any reflex results from the movement of the preceding member of the series. In instinct, the composition of the series is due to the innate strength of the reflexes, while in habit it is due to that element of strength added by experience. The addition of another factor to the definition may be suggested, viz., the idea that these series should possess some degree of reference to a unitary situation to distinguish them from a mere succession of unit acts as when an organism drifts aimlessly about, reacting first to one aspect of the environment and then to another. In Watson's conception each unit of the series appears to be stimulated by the sensory results of the immediately preceding reflex. Any reflex is not conditioned or determined by the resulting physiological states or effects (other than sensory) of the previous acts of the series. There are no neural bonds, links, or causal nexus, between the reflexes for all association obtains *within* a reflex, between the sensory stimulus and the movement. This doctrine is questionable, though the reviewer hesitates to dogmatize concerning it. According to Whitman, the final part of the reproductive cycle of activities in the pigeon is determined by the *exhaustion* resulting from the earlier acts. Transfer of training in the human realm may be mentioned. Watson's conception here seems to imply that the various "neural channels" are isolated and insulated from each other, for the functional potency of any one is determined only by innate conditions and the effects of *its own activity*, viz., recency and frequency. Such an implication does not harmonize with the more prevalent view as to the functional unity of the nervous system.

In conclusion, we may add that an actual trial in the class room has demonstrated the serviceability of this book as a text for students of comparative psychology.

HARVEY CARR

UNIVERSITY OF CHICAGO

THE

PSYCHOLOGICAL BULLETIN

PROCEEDINGS OF THE JOINT MEETING OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION AND THE DIVISION OF PSYCHOLOGY OF SECTION H OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, SAN FRANCISCO, AUGUST 3, 4, AND 5, 1915.

REPORT OF THE SECRETARY OF COMMITTEE ON PROGRAM, J. E. COOVER, STANFORD UNIVERSITY.

A joint meeting of the American Psychological Association and the Division of Psychology of Section H of the American Association for the Advancement of Science was held at San Francisco, August 3, 4, and 5, 1915. Sessions were held in the Philosophy Building, University of California, Berkeley, on August 3 and 5; and in the Department of Psychology, Stanford University, August 4. All were well attended.

The very successful series of meetings opened in the Philosophy Building, University of California, with the morning session of August 3, in affiliation with Section L of the American Association for the Advancement of Science, and the American Association for the Study of the Feeble-minded, at which Professor Cubberley, as vice-president of Section L, gave a brief address of welcome and turned the meeting over to Professor Martin, vice-president of Section H.

An innovation which aided in interpreting and discussing the papers was the introduction of very brief abstracts in the printed program.

A dinner and smoker was held at the Castilian Restaurant, in San Francisco, on the evening of August 4, at which the vice-president of Section H gave an address.

ABSTRACTS OF PAPERS

An Experimental Study of the Subconscious. Address of the vice-president of Section H. LILLIEN J. MARTIN, Stanford University.

In making this study the image method was employed. That is, the observer was instructed to sit in a relaxed position and let an image arise of itself; he was not only not to arouse the image but he was not to know its content until it had arisen, and only those images were noted where the instructions had been entirely complied with. In the other half of the experiments the observer was directed to decide on the particular image he wished to have arise and then to arouse it. The two kinds of images were compared with a view to getting information regarding the subconscious and its relation to the conscious.

1. Results show that the subconscious content (*a*) responds more quickly, in some persons, to the task set than does the conscious; (*b*) differs in richness of content in different individuals; (*c*) has in part remained as originally grouped, in part been more or less broken up, and even recombined into complicated and appropriate groups; (*d*) is evidently not all on the same stratum of consciousness for some of it arises much more spontaneously and quickly and has a different content; (*e*) is sometimes the point of departure of the willed images, which gives it great importance in daily life—advantageous when in the direction of the work in hand; disadvantageous when not; (*f*) is not materially different from the conscious content—which does not support Binet's or Myers' theory but does support Prince's theory that what is under the threshold is an expression of the observer's previous experience.

2. Of interest to General Psychology: Results show (*a*) the necessity for distinguishing between spontaneous and voluntary images; (*b*) vacillation of the attention may be due to a flood of subconscious images or ideas; the genius may get on faster by letting himself go; the student in a field foreign to his natural thinking must take himself in hand or fail; (*c*) new methods are required for quantitative memory investigation; (*d*) memory experiments can be used to measure the strength of the will only when memory is voluntary.

3. Of interest to Pedagogy: Results show that it is possible to educate and enrich the subconscious, and lead one to question whether too much emphasis is not at times placed on the employment of the will in connection with intellectual work.

4. The image method is comparable if not superior to the automatic writing, automatic speaking, pathological, or psycho-analytic methods, for the study of the subconscious.

STUDIES IN EDUCATIONAL PSYCHOLOGY AND MENTAL TESTS

The Stanford Revision of the Binet Scale. LEWIS M. TERMAN,
Stanford University.

On the basis of the results from 1700 non-selected normal children and 400 adults, to whom the 1908 Binet and 25 new tests were given, a tentative revision of the scale was made and the mental ages were calculated for the children of each age group. If the median mental age thus found was at any part in the scale too high or too low it then became necessary to shift certain tests or to change the standard of scoring until the median mental age fell at or very near the median physical age. In this way successive drafts of the revision were made until a scale was found which was equally accurate at all ages. The final arrangement includes 6 tests in each year from III to X, 8 in XII, 6 in XIV, 6 in "Average Adult," and 6 in "Superior Adult." By this scale ordinarily intelligent adults, little educated, actually test up to what is called the "average adult" level, while persons whose intelligence is known from other sources to be superior are found to test, regardless of education, well up to the "superior adult" level. It is believed that the extension and correction of the scale at the upper end will prove especially valuable in the examination of high grade defectives and borderland cases.

Analysis of the data from 1,000 non-selected school children brought out the following facts: (1) That the distribution of intelligence at each age closely approximates the normal curve. (2) That the I Q method of indicating intellectual status holds approximately for the ages 5 to 14, at least. (3) That sex differences in intelligence, and in the nature of its distribution, are negligible. (4) That the rather high positive correlation between mental age and social status is attributable in the main to real differences in endowment. (5) That there is a high positive correlation between mental age and school success; also between mental age and the teacher's estimate of intelligence. (6) That the best method of determining the validity of a test is to measure it against the rest of the scale as a whole.

A New Scale of Mental and Physical Measurements for Adolescents, and Some of its Uses. HELEN THOMPSON WOOLLEY, The Vocation Bureau, Cincinnati, Ohio.

These scales embody the idea that an average of a group of mental tests gives a more significant measure of ability than any one test. They are based on tests of 750 working children at 14 years, and 680 of these same children at 15 years. Practically the same series of tests has been given to the same group at 16 and 17 and 18 years.

The plan of the scales: Each phase of each test is summed up by the percentiles. Every individual is then given a rank from one to ten on each phase according to the percentile in which his results fall. His percentile ranks are then averaged separately for the sets of physical and mental tests. These percentile averages for each sex at each age are again arranged in ten percentiles to form a general scale. New individuals can now be given the series of tests, and their average percentile rank can be located on the general scale.

The scale's significance: First, a given individual does not vary widely on the scale from year to year; second, this ranking correlates closely with school grade completed; third, individuals ranking high in tests but retarded in school have unfavorable social surroundings, and vice versa.

Uses of the Scales. (1) Comparison of groups. Girls of these ages are slightly superior to boys in most of the mental tests, but there are more exceptionally poor girls, and more exceptionally good boys. We find that public are superior to parochial school children in physical and mental development, the boys' differences being large and consistent; the girls', small. (2) The fixing of more adequate standards for determination of high grade mental deficiency. The preliminary results attained from giving the Yerkes point scale to our 18-year-old group indicate that about one-fourth fall below the limit set for normal adults. (3) The relation between manual and mental ability and its educational application. The results show a small positive correlation, but many whose manual ability is greater than their mental and vice versa. An early determination of these differences would have far-reaching educational significance. (4) An analysis of factors making for industrial success or failure. Records of mental ability, manual skill, and social surroundings make possible estimates of their relative importance. During the first two years of industrial

life there is very little relation between mental ability and earning capacity.

A Graded Series of Geometrical Puzzles. GRACE HELEN KENT,
Sterling, Mass.

This series of puzzles is offered as one unit of a group of tests to be used for measuring the capabilities of defective children, especially children who have little or no knowledge of the language in which the test is given. Each of the units is to conform to the following requirements: (1) The test is to call for a motor reaction from the subject, rather than for a verbal response, but is to be essentially mental, not motor. (2) The test is to require the minimum of verbal explanation on the part of the examiner, so that the instructions may be given through an interpreter. (3) The test must possess sufficient intrinsic interest to command the spontaneous coöperation of the subject. (4) Each test must be capable of being graded, so as to be adaptable to the ability of any subject. The method employed must admit of being varied widely in difficulty without affecting the essential nature of the test. (5) Each test must admit of being scored by a system which will give partial credit for partial success. The results are to be scored either by a sliding scale or by empirically determined steps.

The unit here presented includes twenty puzzles, each of which when solved forms a square. The puzzles are arranged approximately according to their difficulty, as determined by the time records of a small group of normal subjects. Each subject tested is to be permitted to solve as many of the puzzles as he can, two minutes being the time allowed for each puzzle. This test may be used to supplement verbal tests. There will be no attempt at present to standardize it on a large scale. It is necessary first to find many other test methods which can be used as units of the group, and the different units must be sufficiently varied to call into play widely different types of mental activity.

Tests for Prospective Students of Stenography. L. W. FIKE, University of California.

A series of tests has been devised at the psychological laboratory, University of California, for the purpose of determining beforehand whether or not a student possesses the mental endowments which are essential in a stenographer. Tests are made of ability to remember, to carry out oral and written directions, to

learn to translate into a code, to concentrate the attention, to perform two operations at once, and of the other fundamental mental traits. It is hoped that the tests will make it possible to eliminate students who will never be able to succeed as stenographers before they have wasted valuable time in studying the subject.

Various Degrees of Success in Public School Training of Mental Defectives. Vinnie C. Hicks, Clinical Psychologist, Board of Education, Oakland.

Ability to support oneself independently and honestly in adult life is assumed as a criterion of successful training of mental defectives by public schools. Such success depends upon three prime factors: (1) Level of mental ability; (2) Moral type; (3) Environment. (1) The level of mental ability must be above that of idiots and imbeciles, for whom the school cannot provide the requisite facilities for large muscle work and house work, or the constant supervision required for training in social and personal habits. Morons and borderline cases admit of education up to the point of self-support, the best results attending those able to learn to change money and attain some manual ability. (2) Except for the moral imbecile, the defectives respond to special training by establishing right ideas and strengthening the will to conform to them. (3) The environment must not counteract the work of the school.

Public school training amounts to little if given in regular classes. It must be under expert management and in small special class groups. For the benefit of the next generation, sterilization should be increased and marriage decreased, for which provisions the school can assist, in reconciling the individual to them.

Results of Tests with Specific Cases with Emphasis on the Study of the Delinquent Type. Grace M. Fernald, Los Angeles State Normal School, and the California School for Girls.

One hundred girls, committed to the California School for Girls, were examined during the last year. Each girl's mental age was determined, first by the Binet-Simon (1911 revision) scale, and, in the last 57 cases, by the Stanford revision as well. Each girl was then tested for special characteristics.

A series graded in complexity, was worked out for each type of test, as perception, memory, imagination, reasoning, etc. For example, three forms of substitution tests were used, four forms

of the code and four types of puzzle box. Considerable work has been done toward standardizing these tests in the Los Angeles Schools, and by follow-up work in individual delinquent cases.

Certain of the tests in both the Binet-Simon and Stanford revision seem particularly unadapted to those cases where the family and school history shows the most unsatisfactory conditions. The definition of "charity," "justice" and "goodness," the distinction between abstract terms, and the differences between president and king were not given in many cases when the child would otherwise have graded up to age, and did such difficult tests as the code and geometrical figures. The Stanford vocabulary was done through the low adult by only four girls in the school. This suggests that other tests, equally difficult but less dependent on formal education, should be substituted for those just mentioned.

We found it entirely possible to run a child through the special characteristic tests and then to check off, on the Binet-Simon or any other scale, what he is able to do with the various tests in that scale. Space allows only the barest suggestion of our results with these tests.

In twenty-four cases girls who possessed excellent memories were hopelessly poor in all their reactions to any tests involving reasoning. In eleven cases girls who were distinctly good in reasoning capacity had only a fair memory span. The girls were uniformly poor in powers of concentration, easily fatigued, and with very few exceptions emotionally unstable. A study of family histories shows that only 13 per cent. of the girls come from homes where the parents live together, and in only six per cent. of these cases is the home in any sense satisfactory. The two most noticeable facts about the school history are, that eleven per cent. of the girls have reached high school, and nineteen per cent. of the defectives were allowed to go above sixth grade though they were unable to do third grade work.

The Result of Mental Tests upon Dependent and Delinquent Children in San Francisco. OLGA L. BRIDGMAN, University of California.

Psychological Tests of Reed College Students. ELEANOR HARRIS ROWLAND, Reed College.

A series of 20 tests was given to 249 students in Reed College. The series included tests in attention, memory, suggestion, logical judgment, association, and other processes. Comparative lists of

the students were made both on the basis of their efficiency in the separate tests, and in certain of the tests grouped together, and their place in these test-lists correlated by Yule's formula with their place in lists compiled from the marks given by instructors in their various courses.

A fairly high correlation figure was found for certain tests. The best figure was for a combination of a cancellation, association, memory, and logical judgment test. Correlations were also made on a sex basis, with fairly high figures in certain tests.

Evaluation of Reactions in an Association Test Designed for the Purpose of Higher Mental Measurements. A. J. ROSANOFF, Kings Park State Hospital, N. Y.

Our general plan for the development of standards in a higher scale of mental measurement has already been described. The question before us now is that of a proper objective evaluation of the reactions to the stimulus words obtained in the test; more particularly, can frequency, here as elsewhere, be accepted as a measure of value?

In response to the stimulus word *refraction* 500 subjects of at least full collegiate education and 100 subjects of not more than high school education, gave the following common reactions, here reproduced together with their respective group values expressed in percentages of frequency: light, 35.2, 5.0; glass, 7.0, 0; reflection, 6.6, 1.0; physics, 6.4, 0; eye, 3.4, 0; lens, 3.4, 0; eyes, 3.2, 0; index, 3.0, 0; refractory, 0.8, 6.0; fraction, 0.4, 4.0; reflex, 0.4, 2.0; deviation, 0.2, 2.0; refract, 0, 5.0; reaction, 0, 4.0; fractions, 0, 3.0; part, 0, 3.0; arithmetic, 0, 2.0; break, 0, 2.0; decimal, 0, 2.0; from, 0, 2.0; numbers, 0, 2.0; retract, 0, 2.0; *failure of reaction*, 0.4, 20.0.

Even more striking differences are indicated in the kind of individual reactions. First group examples are, atmosphere, high, industry, minerals, myopia; second group examples, adding, again, back, bad, biceps. Aside from the obvious difference in quality of the individual responses given by the two groups of subjects, the fact of the far greater number of them given by the second group, 28 per cent. as compared with 12 per cent. for the first group, is of significance, especially in view of the circumstance that there were 0.4 per cent. of instances of failure of reaction in the first group and no less than 20 per cent. in the second. The values of reactions would be erroneously indicated by frequency tables constructed on the basis of material obtained from subjects selected at random;

but a special selection of subjects according to education would seem to make possible the construction of standards that could serve for practical purposes.

The Measurement of Ability in English Grammar. DANIEL STARCH,
University of Wisconsin.

Age Norms of Psycho-Motor Capacity. J. E. WALLACE WALLIN,
Psycho-Educational Clinic, St. Louis, Mo.

Of the numerous methods available for estimating mental capacity none compares in accuracy with the method of controlled psychological testing and mental evaluation by means of experimentally established normal age norms. Few single psycho-diagnostic tests are superior to tests of psycho-motor capacity. Psycho-motor capacity can be tested by form-boards which present a complex and novel problem which requires for its solution motor ability plus the power of sensory discrimination, recognition and association, and the retention of a series of formed associations.

The following are a few of the conclusions reached from an analysis of experimental work on over 4,000 bright, average, dull, feeble-minded and epileptic children and adults, based on one of the best form-boards for testing psycho-motor development (the modernized Seguinian): (1) It is possible to establish not only yearly but also half-yearly normal norms for this test for the ages investigated, 2 to 17. However, semi-yearly norms seem to be sufficiently accurate up to about the age of 8, yearly norms from 8 to about 12, and bi-yearly norms from 12 to 17 or beyond. (2) The performance varies with grade of intelligence: the bright surpass the average, the average the dull, the dull the feeble-minded, the morons the imbeciles. Epileptics are subject to pronounced psycho-motor retardation. (3) Accordingly, normal norms can only be secured by testing approximately normal children. Seventy-five per cent. of the writer's normal group was classified as "average," and about one-half each of the remainder as "dull" and "bright." The character of the groups tested probably partially explains the large differences between the normal norms of three investigators. (4) The boys' performance is superior to the girls'. (5) Satisfactory age scales of mental development can be constructed by assembling a considerable number of tests of various functions for which semi-yearly, yearly or bi-yearly norms have been established, as in the case of this form-board.

Some Aspects of the Problems of Sequence of Subjects in Beginner's Psychology. L. W. SACKETT, University of Texas.

STUDIES IN EXPERIMENTAL PSYCHOLOGY

Experiments on Memory in Progress in the Laboratory of the University of Michigan. W. B. PILLSBURY, University of Michigan.

Up to the present most investigations on memory have used the simplest materials and have dealt primarily with rote memory. Mrs. Austin and Miss Buck have been using material of the kind employed in ordinary instruction and have used the number of ideas retained as a test of memory rather than the number of words or non-sense syllables.

It has been found that grading can be carried on satisfactorily for ideas and that the results check almost as well as for nonsense material. Miss Buck attempted to measure the time-relations between associations affected and effectors in retroactive inhibition. The results were consistent but showed no evidence of the inhibition. In this they agreed with De Camp's work with nonsense syllables.

Mrs. Austin applied the method to a study of the influence of divided repetitions, and the results confirmed the work of Jost and others with nonsense material. It was also found that the effect of dividing the repetitions was greater when the tests were made after an interval of two weeks than when they were made the next day.

In both series of investigations the results indicate that the grading can be carried out consistently if the ideas be made the unit of measurement. It will be possible to check the results obtained with nonsense material for the methods and materials that adults have occasion to remember.

Theories of Recognition. FRANK ANGELL, Stanford University.

Large number and diversity of theories of recognition probably owing to the complexity of the processes of recognition and to the tendency to cover all the phenomena involved with a single principle of explanation.

Danger in relying on evidence derived from pathological sources, and particularly in cases of depersonalization and agnosia where the extent of disturbance in perceptual processes is as yet undetermined.

The writer's view is that recognitions are judgments mediated in a great variety of ways: from reproductive processes, from moods, from syncopated inferences, and especially from feelings of relaxation, themselves of varying origin. In substantiation experimental evidence is offered, derived partly from other investigators' and partly from the writer's own work on the recognition of words and intensities of sound.

A Study of Some Logical Fallacies. KATE GORDON, Bryn Mawr College.

The attempt was made to present certain logical problems in such a form that their dependence upon the use of language could be somewhat reduced. This was done by means of a series of diagrams in which the problems were given in terms of colored circles. The solutions were expressed by the subject choosing and arranging his terms from a supply of wooden circles of different colors and sizes. Twelve diagrams were used, some of them offering the basis for valid deductions and others designed to offer the chance for the fallacies of illicit major, illicit minor, and undistributed middle.

Of fourteen adult subjects, only six made no mistakes in reasoning. A larger proportion of errors was made with negative propositions than with affirmative ones. The tendency to translate the diagrams into verbal form and to rely upon verbal argument was very marked; toward the end of the series, however, some subjects began to use the diagrammatic forms in their thinking. Of the three children who have thus far been tried with the test, two have experienced a curious difficulty in understanding the negative propositions. The study of logical fallacies is important if we accept the theory that fallacies represent primitive or undeveloped reasoning rather than merely wrong reasoning.

The Complication Experiment. C. S. YOKUM, The University of Texas.

In a further study of the "Complication Experiment," the writer used the "exact fixation" method. A large number of preliminary readings was taken with different observers. These earlier series were given to familiarize ourselves with the different forms of apparatus used by previous investigators, to compare their results with our own, and especially to repeat the introspections and results obtained by Dunlap. In the main experiments undertaken, our

apparatus was practically a duplicate of that used by Geiger. These preliminary records duplicated results obtained by the previous investigators.

With the "exact fixation" method, we gave definite instructions to each observer. The left upper quadrant was used in the beginning; after practice, the field used was extended to the entire left half of the dial. O. was directed to fixate the point at the top of the dial, marked 360. He was warned to maintain exact fixation at all times and at the preliminary fixation points to use only peripheral attention in determining tentative coincidences. When he had thus found a point nearer actual coincidence, he might change fixation to this place. By successive approximations he was expected to establish coincidence.

By this method we found that different observers gave typically different results. In the first group of subjects, one made negative errors; one, positive; one, positive with a very small error; and one approximately equal numbers of positive and negative errors. Later an observer appeared, who made a regular series of *reactions* to click or pointer. In all introspections, except those of one subject who made a preponderance of positive errors, we obtained voluntary evidence of the disturbing effects of the after image streak.

A black faced dial with white fixation marks and a black pointer with white tip, give the best "interruption" at the point of fixation, and subordinate other factors in judging coincidence. A further modification of the pointer was made. Here we used a revolving disk in front of the scale on which was placed a single black spot to simulate the pointer. Both disks are white here. By this means a very considerable portion of the positive after image could be removed.

Creative Imagination in Boys and Girls. GEORGE M. STRATTON,
University of California.

Experimental evidence was obtained by having children in the same grades of a coeducational school write (*a*) stories of their own choosing, (*b*) stories which were upon a given theme, and (*c*) stories which were the completion of a story started. In examining the evidence an attempt was made to take account only of matters where the examiner could be free from subjective bias; that is to say, facts upon which there could not easily be a difference of opinion. The findings were that while there was much that was

common in the stories of the boys and of the girls, yet there was a noticeable difference in many respects. The girls, for example, introduced more "characters" than did the boys. They were much more inclined to make these characters vivid by giving them personal names. They were far more inclined to make the story vivid by introducing conversation or dialogue. In general, the girls showed greater emotional variety in their stories and especially a greater use of the kindlier emotions. The boys introduced oftener unsympathetic emotions and were readier, perhaps on this account, to compose stories with an unhappy ending.

Further evidence, obtained by the reports of students recalling their action in childhood, indicates that girls give themselves more fully to story-composing, feel more intensely the reality of what they thus create, introduce themselves more often as characters in their stories, and compose more spontaneously than do the boys.

These differences may in a measure be due to differences of experience and of social influence in the case of the two sexes, yet, coming as it does in a region where so little social pressure is brought to bear upon very young children, it would seem as if there was a residue of difference which could not be accounted for in this way. It would seem that there is at least in the story-composer's art a certain original difference in the imagination of boys and of girls.

The Psychology of Similes and Metaphors. JUNE E. DOWNEY,
University of Wyoming.

Experiments upon Figures of Speech have yielded results varying with the method of procedure: (1) The situation requiring the reagent to complete similes, for the purpose of studying the figure-consciousness, proved to be highly artificial. (2) More enlightening was the method of observing the occasional simile or metaphor in the making. (a) The spontaneous replacement of one mental object by another, in the manner of dream-substitution, confirms Sterzinger's conclusion as to the relation between the dream and the metaphorical consciousness. (b) The presence of both parts of the metaphor in consciousness, and a tendency to emphasize the substituted object at the expense of the main object, do not support Stählin's conjecture that imaging the secondary part of the figure would tend to obliterate the main object and is therefore undesirable and infrequent. (3) Introspective reports from reagents required to read passages containing metaphorical expressions in various forms from the expanded simile to the most telescoped metaphors,

although difficult to obtain, since the metaphor consciousness involves a conscious attitude of double meaning, often including the tension of an unsolved problem, indicate that (a) Replacement of one mental content by another or fusion of the two could be definitely observed in certain cases by all reagents, the most favorable cases being the definitely worked out similes, which, however, might not prove as emotionally satisfactory as a more closely packed figure or one creating tension. (b) The most easily identified substitutes were those in which both parts of the simile were imaged visually. (c) The predominance of imagery for the accessory part in comparison with the main part confirms the results of Groos in the case of certain similes only. One simile gave for the majority of the reagents imagery for the main object alone with emotional toning for the figurative part. (d) In general, the mood-value of a simile or metaphor was often evident.

Experiments on Suggestion. WARNER BROWN, University of California.

Suggestions of some twenty-five different kinds involving imaginary perceptions and sensations, effects upon memory and recognition, effects upon æsthetic judgment and upon judgments of magnitude, were administered to a large number of university students. In all cases the suggestions were given in the form of misleading statements contained in written directions for what purported to be simple laboratory experiments on sensation, memory, æsthetic preference, etc. Most of the tests were successful in producing a positive response to the suggestion from a majority of the students; some succeeded with practically all of them. Women proved considerably more suggestible than men. Low, but generally positive, correlations were found between different tests. The correlations were higher for men, as a rule, than for women.

The Effect of Suggestion on a Case of Traumatic Hysteria. KATE BROUSSEAU, Mills College.

Pneumographic Experiments on Mongolian Idiots. KATE BROUSSEAU, Mills College.

Slides were exhibited showing some results of pneumographic experiments on a number of Mongolian idiots in the State Institution for Feeble-Minded Women, Vineland, New Jersey, and in

the Sonoma State Home, Eldridge, California. The pneumographic records of Mongols differ essentially from those obtained in experiments on other classes of defectives. The pneumographic curve is characteristic of the type.

PSYCHICAL RESEARCH

The Method of Psychical Research. JAMES H. HYSLOP, American Institute for Scientific Research, New York.

The method of psychical research is the method of all science. It has, however, for the accurate determination of the facts in alleged telepathy, clairvoyance, apparitions, and communication with the dead, shifted its plane of application from the conjuror and the theory of conscious fraud to the hysterical and the principles of abnormal psychology. The subconscious and its various phenomena of automatism and alternation of personality must now be the avenue of approach to the subject. Physical phenomena are of but secondary interest, beyond which the quest for proof of survival of death must extend to personal identity afforded by the incidents in the memory of deceased persons communicated in a supernormal manner. It is more than probable, as Kant said, that psychical phenomena will always be found in the borderland of hysteria and its congeners. The principles and method of scientific psychology must therefore determine the nature and significance of these phenomena and thus decide the issue of the supernormal.

The Stanford Foundation for Research in Psychic Phenomena. FRANK ANGELL, Stanford University.

Experiments in Psychical Research at Stanford University. JOHN E. COOVER, Stanford University.

Some of the more available psychical phenomena which are amenable to the procedure of the psychological laboratory or to the use of scientific apparatus for adequate observation, and which through the results of their investigation have contributed to our knowledge of facts in this field, within limits of experimentation, are: (1) *Thought-Transference*.—The setting of a laboratory experiment in thought-transference evokes in the normal reagent automatic sensory and motor phenomena which influence his judgments, enabling him to assign to them from two to five grades of certainty, and determining his expectation for a greater number of

R cases than chance allows. Judgments given with a high degree of certainty have no advantage over the others, and R cases (in 10,000 experiments) do not exceed the limits of chance. Similar conclusions are drawn from 2,500 experiments on the "Feeling of Being Stared At." Richet's *Suggestion Mentale* was not found. (2) *Subliminal Impression*.—Guessing on letters and digits, exhibited with a Wirth tachistoscope variously for from 4.9 to 9.5 thousandths of a second and unperceived by the reagent, yielded some evidence for the influence of subliminal impression upon judgment. (3) *Auditory Assimilation*.—Results of 15,000 records of syllables heard under varying conditions all of which were adequate for communication, show that when judgment must depend upon sensory impression R cases on syllables fall to 40 per cent., and on consonantal sounds to 60 per cent. Central contribution to perception, under these conditions, consequently, is 60 per cent. and 40 per cent. respectively. (4) *Dowsing*.—150 determinations for gold resulted in 3.3 per cent. R cases for gold and 5.3 per cent. for copper as against the 3.3 per cent. of chance. Copper was a control determination. (5) *Séance Phenomena*.—Pneumographic and pulse (carotid) tracings by a kymograph show that the "psychic's" vocal musculature acts synchronously with "independent" speaking, and imprints upon smoked surfaces indicate physical contact during exertion of "independent" force.

A Case of Pseudoprophecy. LILLIEN J. MARTIN, Stanford University.

The point of the paper is to show that the striking resemblance between a Stanford poster made by a student in geology three years before the earthquake of 1906 representing the Stanford memorial arch as partially demolished, and a photograph of this arch as it appeared after the earthquake, is a case of scientific prediction and not of prophecy as has been said in the newspapers and elsewhere.

MISCELLANEOUS STUDIES

The Justification of Psychobiology as a Topic of the Medical Curriculum. DR. ADOLF MEYER, The Johns Hopkins Hospital, Baltimore.

A certain level of the activities of the biological organisms we study could not be initiated except as full-fledged conscious processes. These activities have of late been summed up as the data

of behavior, forming the subject-matter of psychological investigation. Based on a nominalistic and anthropomorphic emphasis of the subjective experience, parallelism is made to serve as an intermediary between the absolutely subjective psychologizing of the past and the demand for strict objectivity of the natural sciences. The compromise has not been able to overcome the psychophobia of scientists. Without wanting to disclaim the practicability of studying many problems on the parallelistic basis, I assume in my work the common-sense attitude that we study not an ego but the mentally connected activities of any biological organism, or individual, or group, as the domain of psychology, and that we embody in this field all the mentally connected relations including what is sometimes specified as "purely mental" inasmuch as we can make it a topic of objective consideration and experimentation. The division of sciences lies between those dealing with the dynamic biological processes of the entire individual as opposed to the activities of detached parts, and those dealing with adynamic logical relational connections. Interactionism is eliminated by a consistent objective method. It must be possible to study activities of the level of mental integration in others as well as in ourselves, and there is as little need of abandoning objective methods as there has been any need of abandoning the objective methods of physics in the face of the psychologizing considerations of Herz and Mach.

The Functions of a Psychologist in a Hospital for the Insane. SHEPHERD IVORY FRANZ, Government Hospital for the Insane, Washington, D. C.

It is only in the institutions for the insane with the highest ideals regarding their duties to patients and the community that a psychologist can have functions. His functions in general are those of investigation, and this investigation is of mental conditions in the different forms of mental diseases, not from the psychiatric standpoint of differential diagnosis and treatment and not from the purely medical standpoint, but from the scientific standpoint of inquiry and advance of knowledge of mental abnormalities. In this work no exclusive form of psychology, analytic or functional, should be used.

Mental Hygiene of the Backward Child. HENRY H. GODDARD,
Vineland, N. J.

The backward child has a peculiar mind. Generally it is a mind that has ceased to grow. Sometimes it continues to develop, but slowly. In either case treatment such as is given to the normal developing mind is unhygienic. It is like requiring of a baby physical work appropriate to an adolescent. It causes mental strain, perverts the character and discourages effort. The backward child largely lacks associative memory, creative imagination, power to associate by similarity and to deal with abstractions. He must therefore be trained in concrete activities.

Prognostic Value of the Binet Tests. EDGAR A. DOLL, Vineland, N. J.

In the diagnosis of feeble-mindedness we distinguish two types of borderline cases: those of mature age who approximate normal capacity, and those of younger years who, although not yet fully retarded mentally, will ultimately never have normal capacity.

These cases while not showing the requisite three years backwardness by the Binet Scale nevertheless by the quality of their answers are to be differentiated from the thoroughly normal child. In other words, it now seems probable that the Binet Tests may be able to show not only those who are already feeble-minded, but those who are destined to become so.

Mental Hygiene for Freshman, as a Subject of the Curriculum. Discussion opened by LILLIE J. MARTIN, Stanford University.

Methods of Studying Ideational Behavior in Man and Other Animals. ROBERT M. YERKES, Harvard University.

Attempts to devise methods for investigating imagination, simple ideation, and reasoning in infra-human animals have been many, but no good comparative method has been developed. Casual tests, qualitative merely, predominate. Of the many methods, extensively if not intensively used, the following are the most noteworthy: (1) The problem or puzzle-box method (Thorndike *et al.*); (2) the imitation method; (3) the use of tools; (4) the substitution method; (5) the delayed response method (Hunter); (6) the serial stimulus method (Cole); (7) the quadruple-choice method (Hamilton).

No one of these types of method at present meets the following

requisites of a good means of studying ideational behavior comparatively. (1) Applicability to a wide range of organisms, ages, stages, and conditions thereof, including man; (2) standardization of apparatus and procedure so that directly comparable data shall be obtained; (3) quantitative results must be yielded, varied but definitely describable according to an accepted convention; (4) the results must remain intelligible and interpretable irrespective of observer, time or place, for only thus can the method of comparison achieve its highest value to genetic psychology.

I therefore present for trial and criticism a method which in theory and practice seems to me superior to others. It is a relational method, involving multiple choices, and hence called the multiple-choice method of studying ideational behavior. Reaction mechanisms are presented to the subject in groups of varying size, position, etc. One only of the mechanisms of a given group will yield satisfaction when operated, the others yield failure or some more rigorous punishment. The correct mechanism always bears a certain definite and constant relation to the other members of the group, for example, the middle member. That the method is widely applicable is certain, for already through adaptation of the reaction mechanism to the structure and action system of each type of subject, it has been used successfully with the crow, pig, rat, ring-dove, monkey, orang utan, child (normal and defective), and adult (normal, defective, and insane). It is already obvious that the method enables us to compare, as has never before been possible, the responses, to certain standard situations, of human and infra-human, normal and abnormal, mature and immature subjects.

The Behavior of Cells. S. J. HOLMES, University of California.

Experimental studies in embryology and observations on the activities of cells kept in hanging drop cultures have shown that the behavior of cells plays an important part not only in establishing the normal form of the organism, but also in maintaining this form, and in restoring it after the loss of parts. Different tissue cells have their specific modes of reaction to stimuli which are as characteristic as the peculiar behavior of different species of protozoans. The activities of leucocytes are well known. Mesenchyme cells commonly undergo extensive migrations during embryonic development, and in many animals the primary sex cells wander for a considerable distance before reaching the sex organs. Connective

tissue cells and pigment cells may creep about quite extensively even in the adult animal. Many cells such as those of epithelium which appear to be quite passive so far as locomotion is concerned, are able when their normal relations are disturbed to become very active and to creep into new positions in such a way as to effect a restoration of the normal condition. The characteristic layered arrangement of epithelial cells in the body is the outcome of their thigmotropic and other tropic reactions.

The outgrowth of the nerve fiber is apparently the result of a form of amoeboid movement much like the extension of a fine pseudopod of one of the Rhizopoda. The paths followed and the connections made by nerve fibers, and the interconnections made by ganglionic dendrites in the central nervous system are probably the effect of a series of thigmotropic and chomotropic responses of developing nerve cells. So the architecture of the nervous system is largely the expression of the peculiar behavior of its cellular components, and as the psychology of an animal is determined in great measure by the organization and connections of its nervous system, we may say that organismal psychology is to a great extent the outcome of the specific behavior of the cells which make up an animal's organization. What might be called cellular psychology has been studied but little. Most attention has naturally been given to the study of the behavior of the organism as a whole and its relations to environmental agencies. But investigation of the reactions of cells and tissues carried on much as the psychologist studies the behavior of lower organisms promises to aid in the solution of many biological problems and to shed light on problems lying more strictly within the recognized scope of psychology.

GENERAL REVIEWS AND SUMMARIES

MEMORY, IMAGINATION, LEARNING, AND THE HIGHER MENTAL PROCESSES (EXPERIMENTAL)

BY J. W. BAIRD¹

Clark University

I. MEMORY, IMAGINATION, LEARNING

(a) *Summaries, Systematic Treatises, and Discussions of General Topics.*—Brandell's monograph on imagination (3) traces the evolution of the significance of the term from Aristotle through Saint Augustine, Wolff, Kant, Lotze, Wundt, Ebbinghaus and Meumann. In a survey of the experimental literature,—Külpe, G. E. Müller, Ach, Dürer, Perky, Martin, Moskiewicz, Selz and others,—he discusses such topics as the materials of imagination, assimilative and associative imagination, the relation between thinking and imagining, and the creative power of imagination. While the monograph contains nothing that is essentially new, it presents a statement of the various views and an evaluation of certain of the experimental findings. Brandell's own position is conservative; the influence of Wundt is evident throughout his monograph. Gallinger's book (16) undertakes to analyze the state of consciousness which constitutes remembering; he proposes in a later book to deal with the varieties, the forms and the conditions of remembering, together with such topics as recognition and illusions of memory. In the present work he points out that the essence of the remembrance-consciousness consists in the fact that we there project ourselves into our past or assume an attitude toward our past; and it is further characteristic of remembrance that in this attitude, we are immediately aware that our present experience refers definitely to our past. In consequence of this there is a certain analogy between remembering and perceiving; but re-

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membrance is sharply demarcated from all knowledge which is based upon influence, reflection and the like. The author, however, refuses to formulate a definition of remembrance, chiefly on account of difficulties of language, but he feels that in pointing out its specific criteria he has sufficiently differentiated it from other experiences.

Tsanoff (59) raises the questions: "What is the peculiar coloring of consciousness and what is the particular correlation of mental elements which characterize the processes of the poetic imagination? Precisely how can the poet's actual construction of a poem be described in psychological terms?" He points out that the experimental investigation of the actual process of poetic construction is difficult since this process is essentially spontaneous, and hence is not subject to laboratory control; and he suggests that a comparison of the first draft of poems with later emended copies promises to furnish a fruitful method of investigation. Beck (2) calls attention to the fact that such activities as entail a considerable element of danger (climbing precipitous mountainsides, duelling, and the like) are attended by a superlative degree of mental concentration which is rarely found elsewhere; that this concentration is of exceptionally high degree is attested by the fact that such experiences are remembered for many years, and by the fact that serious physical injuries are momentarily unnoticed. Beck also believes that after the threatened danger is past one feels a mental recuperation as after a refreshing sleep. A review of Thorndike (56) will be found elsewhere in this volume of the BULLETIN.

(b) *Imagery*.—In an investigation undertaken by Misses Adler, Williams and Washburn (1) an attempt was made to determine what correlation obtains between the fidelity of one's visual imagery and the control of one's visual imagery. The method consisted in measuring the observer's accuracy in reproducing a visual nonsense-figure, and in measuring her ability to control her visual imagery (*i. e.*, after a checker-board diagram of sixteen compartments had been presented the observer was asked to close her eyes and imagine the content of a given compartment to be shifted to another specified compartment). The results obtained from fifty-three observers show a complete absence of correlation between accuracy and control of visual imagery.

A reading of Freud's *Traumdeutung* led Thompson (55) to investigate certain dream phenomena of condensation, compensation, ratiocination, amnesia, etc. An examination of a number of dreams leads the author to conclude that in any given individual there is

no essential difference between the relative preponderance of the various modalities of imagery in dream life and in the waking life; that the central *motif* of the dream tends to appear in terms of that modality of imagery which predominates in the waking life; that condensation occurs more frequently in visual than in auditory imagery; that imagery of the dominant modality is less readily forgotten than images of other modalities; and that the imaginal content of the dream can seldom be referred to a present sensory stimulus. The author believes that a dream may contain instances of critical thinking and reasoning which possess 'all the clearness and logical consistency of waking trains of thought.' Spaier's investigation (52) of the evoking of images and of the ideation of various problems and situations furnished the following results: The image is not fixed and stable, but develops gradually to a maximum and disappears slowly through a twilight stage; the image is not 'useless lumber'; it is essential to meaning, and it is never present to consciousness without being 'saturated with meaning.'

After presenting a description of the Pawlow method and a summary of the results, Miss Dontchef-Dezeuze (6, 7) undertakes to discover a psychological basis for the conditioned reflex. This phenomenon is to be explained by assuming that mental imagery has intervened between the stimulus and the response; if no imagery were present, it would be impossible to understand how the dog could recognize a familiar stimulus (!). The imagery is to be conceived as of complex structure; while it contains sensory components from various modalities, its essence is furnished by affective images. The author believes that objective psychology is able to throw a flood of light upon the subjective study of memory and imagination.

In an investigation of methods for determining ideational type Exemplarsky (8) presented consonants in visual and in auditory fashion, introducing various distractions and various instructions as to method to be employed in learning. In certain cases, reproduction was tested immediately after presentation, in other cases after an interval of ten seconds had elapsed; and the learners furnished introspective descriptions of their learning and their reproducing. A comparison of the results obtained in these various experiments leads Exemplarsky to conclude that a combination of several methods must be employed for the diagnosis of ideational type. The method of immediate reproduction possesses

certain advantages (for instance, it facilitates introspection), but it should be supplemented by a method of delayed recall. The author reports that for the differentiation of the verbal sub-types, variable modes of presentation furnish better results than the distraction method.

Springer (53) presented numbers in various fashions to four hundred and ninety-four children, seven to fifteen years of age: In one case the numbers were seen; in another case they were heard; in another case they were seen and pronounced by the children; in a fourth case they were heard and pronounced by the children. The results showed that only about two per cent. of the children relied exclusively upon 'one kind of reproduction'; in young children the best results are obtained from auditory presentation, in older children from visual and visual-motor presentation. Immediate memory is most efficient in the fifth and sixth groups. The auditory type predominates in the first and second grades; the visual or the visual-motor in all the other grades, there being a rapid increase in the visual type from the first to the fifth grade, the visual-motor type being predominant among the group of five hundred children. Children of a dominantly auditory type find that the introduction of the motor element is a distinct disadvantage.

Kollarits (23) describes the nature and the origin of our mental representation of various ideas; persons and places which one has never seen are definitely envisaged and it is possible to discover that one's mental picture is the product of associations of various sorts (for instance, an author's style, or his opinions, or his nationality, or his name contributes to our visual representation of his appearance) in which affective association plays a prominent part. Claparède (5) adds that the appearance or the sound of a person's name determines our mental representation of the person,—a fact which has been recognized by authors who have invented such names as Tartarin or Pickwick.

(c) *Recognition*.—In an investigation of recognition and reproduction, Rybnikoff's experimental material (48) consisted of groups of digits, and he employed time-intervals of one minute, five minutes and ten minutes. The numerical data from his reproduction experiments furnish an approximate confirmation of the traditional curve of forgetting; and the numerical data from his recognition experiments indicate that the efficiency of recognition follows the same course with the lapse of time. When the number of presentations is increased from one to three and to six, the

number of recognitions (average for seven observers) is increased from sixty to seventy-four and seventy-eight,—the effect of the increase in number of presentations being especially evident in an increase in the number of 'certain' recognitions. The recognition-time decreases markedly with the number of presentations; an analysis shows that there is a close correspondence between certainty of recognition and brief recognition-time, the most certain recognitions being about twice as rapid as the uncertain recognitions. Rybnikoff advocates the view, in opposition to G. E. Müller, that there is an intimate internal relationship between the phenomena of recognition and of reproduction. He holds that the experimental investigation of reproduction and recognition must mutually supplement each other, and a complete picture of the phenomena of memory can not be obtained from an isolated investigation either of recognition or of reproduction. Ponzo (41) presented pictures and objects to fifteen boys in an attempt to determine the influence of various mental factors upon the processes of recognizing and naming. In his discussion of recognizing he differentiates the influence of complexity, size, color and particularity of object, influence of æsthetic factors, and influence of enlargement or reduction of customary size; and in his discussion of naming he differentiates the influence of the customary name, influence of the name in other languages, influence of ambiguity of name, influence of the essential quality of the object, and influence of the use of the object.

Miss Heine (18) made a further investigation of the fundamental difference between recognition and reproduction which Müller had pointed out. Lists of nonsense-syllables were learned, and after an interval of eight minutes tests of recognition or of reproduction were applied. In certain cases pictures were observed and described, or other nonsense-syllables were learned, during the interval between the learning and the test; in other cases no material was presented during the interval, the observer simply walking about the room, looking out of the window, etc., but endeavoring not to think of the syllables which had just been learned. It was found that the subsequent presentation of new material gave rise to no retroactive disturbance in the case of recognition, but that reproduction was very much impaired by the subsequent mental activity,—not only were the number of correct reproductions decreased, but the reproduction-time was increased. The author concludes that since mental activity following upon the learning

of a series of syllables gives rise to a retroactive disturbance of the associations which have been established, and since no such effect upon the recognition of syllables takes place, it is evident that recognition is not dependent upon association. Reproduction and recognition are, therefore, fundamentally different processes. In a comparative study of recognition and recall Myers (35) finds that the efficiency of recognizing (discrete words) is about two and a half times that of reproduction, and that the correlation between the two is surprisingly low. He finds that affective components are much more prominent in recognizing than in recalling.

(d) *Association and Inhibition*.—Foster (12) investigated the factual justification for assuming the existence of perseverative tendency,—this term being employed to designate the fact that when a given content has once been present in consciousness its recurrence need not be attributed to any other condition than its previous presence in consciousness. Nonsense-syllables were employed as materials, and after intervals which varied from one minute to twenty-four hours, reproduction was tested by the method of right associates and the method of retained members. In his various experiments, the instructions were varied to emphasize rapidity of reaction in certain instances and accuracy of reaction in others. Foster's results show that it is unnecessary to assume that an idea tends to arise without the probable coöperation of associative tendencies. Such syllable-ideas as came to consciousness during the interval between the learning and the testing were found to follow or to accompany an idea of a larger situation; and the syllables, correct or false, which were reproduced in the tests also owe their reproduction to associations of various sorts. Not only may one question the assumption that mental contents recur spontaneously, but the spontaneous nerve functioning which such an assumption implies is rendered improbable by the known facts of physiology.

In Maloney's experiment (28) lists of digits were added by sixty-five persons; from an objective analysis of the errors, the author draws various conclusions as to association, suppression and perseveration. Kohs (22) traces the development of the association-reaction; he emphasizes its practical significance and adds a list of complex-indicators.

Previous investigations of effectual and generative inhibition (or reproductive and associative inhibition as Ebbinghaus calls them) have shown only that these two forms of inhibition take place

between elements which belong to different complexes of ideas; Frings (14) seeks to discover whether such inhibitions also take place between elements which belong to the same complex. His materials consisted of lists of nonsense syllables, three consecutive syllables of a list constituting a group or complex; and the lists were so constructed that certain syllables of certain complexes recurred in other complexes, in accordance with an appropriate pre-arranged plan. The results show that when the elements form a unitary and coherent complex there is no evidence of an inhibition; but when the complex is incoherent and loosely articulated, the recurrence of identical elements gives rise to inhibition,—the amount of inhibition varying with the degree of non-coherence. Several factors may contribute to the non-coherence of the complex: the learning-type, and the physiological condition of the learner.

Brown's experiment (4) consisted in establishing an habitual reaction, and subsequently in assigning a task whose accomplishment inhibited and was inhibited by the habitual reaction. The primary habit consisted in distributing a pack of cards in a prescribed fashion; and the secondary habit consisted in distributing the cards in another fashion. The time-records show that slow reagents are less impeded by the interference than rapid reagents; there seems to be a correlation between freedom from interference and capacity to learn, since those reagents who are most capable of acquiring the primary habit seem to be relatively incapable of acquiring the secondary (interfering) habit. There are wide individual variations in capacity to shift from one group of reactions to another, the loss of speed due to the shift varying from one per cent. to twenty-three per cent. Reagents who are relatively slow at the outset tend to remain relatively slow throughout, although their inferiority decreases somewhat particularly during the earlier stage of practice.

(e) *Learning, Remembering and Forgetting.*—Kühn (24), Myers (34) and Thorndike (57) report re-investigations of the effect of recitation upon learning. Kühn employed significant and non-significant materials; and he tested retention, by the method of correct associates and the saving method, after intervals of one, two or four days. He found that recitation is advantageous, in most learners, but the advantage is greater the less coherent and significant the material, and he concludes that the advantage is due to the fact that an attempted recitation induces a more thorough

working-over of the material. Kühn differentiates and describes various different methods of procedure in learning. Myers employed lists of words whose retention was tested at intervals up to three weeks,—the object being to determine the effect of recalls which were attempted during these intervals. He found attempted recall improves retention; two recalls are better than one and delayed recall (after five minutes) is better than immediate recall. Myers reports that a remarkably large number of words appear in the later recalls which were not present in the earlier recalls. This same phenomenon is reported by Hugeunin (19) who finds that the number of lines of poetry which can be recalled ten minutes after learning it is less than the amount which is reproducible at any subsequent time (up to eight weeks). Thorndike reports that in an experiment where twenty-eight adults learned vocabularies, in one case by successive readings and in another case by reading and attempted recall, the recall method possessed no superiority over the reading method.

In an objective and introspective study of the process of learning Perrin (39) employed an outdoor maze of ordinary dimensions and a miniature pencil-maze,—the learner being blindfolded in the latter experiments. It was found that the ability to make an errorless circuit developed into an ability to image the path and to describe it verbally or graphically. The learner set himself the task of discriminating the true path from the false, and of retaining a remembrance of the former; he also attempted to organize his knowledge in such a way that it could be used for effective control. During the early circuits, whatever paths presented themselves were tried in an aimless fashion, this initial period being followed by an increasing tendency to hit upon the true path, and an increasing rapidity of circuit. Perrin's introspections, which were confirmed by numerous ingeniously devised control-experiments, show that the process of learning the maze is based essentially upon imagery,—concrete visual imagery together with verbal and motor images of various sorts.

In Miss Perkins' experiments (38) sixteen repetitions were devoted to lists of nonsense-syllables, the repetitions being variously distributed; retention was tested after an interval of two weeks. The results are exceedingly irregular, but they indicate that distributed repetitions are more efficacious than accumulated repetitions. Lyon (26) also found that distributed repetitions are more advantageous for non-coherent materials (nonsense-syllables,

digits), while for coherent materials (prose, poetry) accumulated and distributed repetitions are about equally effective. In the case of non-coherent materials, the total learning-time varies with the length of the list of material when the distributed method of learning is employed, but it varies with the square of the length of the list when the accumulated method is employed. Lyon concludes that the optimal distribution of single readings is obtained when the length of interval between successive readings increases in arithmetical proportion. Pyle (42) reports an experiment which investigated the relative advantage of five hours' practice per day and one hour's practice per day in learning typewriting. Ten learners took part in the experiment, five practicing for ten half-hour periods a day with half-hour rests between practices, and five practicing for two half-hour periods a day, one in the forenoon and one in the afternoon. Learners of the former group practiced for a period of nine days and those in the latter group for a period of forty-five days. The results (which are exceedingly irregular and unconvincing) show that the group whose practice was distributed, wrote more rapidly throughout than the group whose practice was accumulated; but a subsequent test indicated that the retention of the learning was not more permanent in the former case than in the latter. In Strong's investigation (54) intervals of varying length elapsed between successive presentations of the materials (advertisements); it was found that an interval of a day produces maximum retention, while intervals of a few minutes, and a week are much superior to that of a month. As to length of learning-time, it was found that the greater the number of impressions made at one time, the less is the permanent retention of any one of them. In any situation which involves both number of impressions and length of interval the former is the more important factor. Winch (61) reports the results of an investigation of the relative value of different methods of learning to spell. Two lists of words of equal difficulty were prepared; one list was learned by a silent visual method, the other list by a combined visual-auditory-vocal-motor method. The results show that the visual method was more advantageous throughout, a fact which is to be interpreted in the light of the author's remark that in the latter case the pupils learned the spelling "without the stimulus or interference of the teacher's direction." Ruckmich (47) examined the current literature of piano instruction with a view to determining what types of association are fundamental to the methods

advocated by various piano-teachers and piano-schools. He finds a complete disagreement among the experts in this field; certain teachers emphasize the significance of the visual and kinæsthetic perception of movements made by the finger, hand and arm; others emphasize the significance of establishing an association between the auditory and the kinæsthetic perceptions. The scientific investigation of the psychology of piano playing has been neglected, but a beginning has been made by Seashore, Raif, Binet and Courtier. Schlüter (50) attempted to evaluate the relative merits of the 'word method' and the 'object method' in teaching a foreign language. In one case foreign words were presented in conjunction with their equivalents in the mother-tongue; in the other case the foreign words were presented in conjunction with the objects which they designated. It turned out that each method has its advantages and its disadvantages. When the result of the learning is tested by the learner's ability to translate from the foreign language the 'word method' proved to be superior; but the 'object method' gave better results when the test consisted in translating into the foreign language or in reproducing the foreign name of a presented object. Neither method of teaching proved to be so qualitatively 'pure' or so specifically different from the other as has been supposed,—when an object is presented the learner tends to ideate the name by which it is known in the mother-tongue, and when a word is presented the learner tends to ideate the corresponding object.

Watkins (60) finds that the span of immediate memory (for digits and nonsense-syllables) is considerably greater in bright pupils than in dull pupils. When the group of material is so great as to approximate the limit of memorial span, the bright child apprehends it as a unitary whole, while the dull child tends to apprehend it as a series of isolated and independent terms; perseveration and retroactive inhibition are more frequent in backward than in intelligent children. Scheinermann's experiments (49) show that there is a progressive decrease of memory span (for isolated letters) with progressive increase of fatigue. His observers report that fatigue decreases the activity and narrows the compass of attention.

A symposium discussion of the rôle of repression in forgetting (37) is characterized by its guarded and conservative attitude toward Freudianism. Pear attempts to differentiate between cases of forgetting where the lapse is capricious and temporary, and cases

where it is due to the inevitable fading of the memorial content; the former alone he is disposed to explain by assuming that a process of active repression has taken place. Wolf refuses to grant the validity of Pear's distinction; all cases of forgetting may be explained by the traditional factors of retention and recall, and the appeal to resistance (repression) is gratuitous. Mitchell holds that certain cases of normal and pathological forgetting are most readily explained by repression; but there is no justification for supposing that all mental dissociation can be accounted for by repression or that all forgetting is due to a tendency to avoid pain. Loveday points out that the Freudian view is absurd since it implies that every content that can ever be recalled must be present in the unconscious all the time,—an absurdity which owes its origin to Freud's associationism and his lack of a theory of judgment. Most cases of forgetting in normal individuals are not due to a desire to forget. Frink (15) describes three cases of forgetting which he attempts to explain in Freudian terms.

Rose's investigation (46) aimed to test the validity of the distinction which Müller makes between visual 'topical' memory and the traditional visual memories of form and of color. Twenty-five lamps were arranged in a frame, and they were so coupled that they could be flashed in any desired sequence, regular or irregular,—the observer being required subsequently to reproduce the positions of the lamps and the sequence. In supplementary experiments nonsense-syllables were substituted for the lamps and an attempt was made to exclude the participation of form-memory. The results justify the hypothesis of a 'topical' memory; and they furnish an analysis of various factors which play a part in the remembering of positions and sequences.

(f) *Attitude, Intention and Determination.*—Fernberger (9) reports the case of an observer who gave not a single judgment of equality in a series of twelve hundred judgments of lifted weights. A special investigation, under varied instructions, showed that the *Aufgabe* is of prime significance in the process of judging, and confirmed the hypothesis that the absence of judgments of equality was due to the fact that the observer had set himself the task of discovering a difference. In an investigation of the 'will to learn' Miss Panicelli (36) read a story to groups of children, in one case warning them in advance that they would be asked to reproduce it, and in another case omitting the warning. The learning was approximately twenty-eight per cent. more perfect in the former

case than in the latter. The 'will to learn' was more effective in girls, and in older and more intelligent children. In an attempt to determine what is the best means of acquiring facility in using a multiplication table Kirkpatrick (20) investigated the relative efficiency of three methods. A multiplication table was placed in the hands of two groups of students, one group being instructed to memorize the table, the other to begin at once to practice writing the numbers which appeared in the table. Three weeks after the preliminary practice both groups were tested as to their remembrance of the table, when it was found that the 'practice' group excelled the 'memory' group. In another experiment students were required to multiply numbers, one group being provided with a multiplication table, while another group discovered the products without a multiplication table; here again it was found that the 'computing' group obtained a much more accurate and permanent knowledge of the products.

Meyer (30) presented lists of nonsense-syllables and after an interval of twenty-four hours he re-presented a certain syllable with the instruction that the observer should attempt to recall the syllable which had followed it in the original series. When the next syllable was presented the observer was asked to state whether it was 'new' or 'old,'—the object being to determine whether preparedness to recognize really facilitated the process of recognizing. The results (recognition-times and number of correct recognitions) show not only that preparedness conduces to recognition but also that the state of preparedness may persist for a considerable time.

Myers and Valentine (33) differentiate a number of individual differences in attitude of observers toward tones. These attitudes are four in number: An objective attitude which has to do with the relation of the tonal stimulus to the observer's standard of purity, pitch, etc.; a character attitude which is due to the observer's tendency to personify tones; an associative attitude which is characterized by a wealth of ideational content suggested by the stimulus; and an intra-subjective attitude which is characterized by an emphasis upon the sensory effects, the feelings, and the self-activity aroused in the observer by the stimulus. The authors point out that certain of these aspects are divisible into various sub-aspects; there is a general agreement between attitudes adopted by observers toward colors and toward sounds, but certain important differences are described. The authors also discuss the relative frequency of the various attitudes.

II. HIGHER MENTAL PROCESSES

Maday (27) outlines a hierarchy of mental functions and raises the question of the intellectual equipment of the horse. Concepts are formed through a gradual process of apprehending differences; thinking consists in associating concepts into judgments and judgments into conclusions. Three stages may be differentiated in the forming of concepts and in thinking, and it is doubtful if the horse ever passes beyond the initial stage in either process.

Kline (21) describes an experiment for the investigation of the psychology of reasoning. The materials consist of problems relating to the calendar, and the method consists in obtaining an introspective analysis of the processes involved in solving the problems assigned. In Peterson's investigation (40) of the generalizing ability of children, questions were presented to children from ten to fourteen years of age, the questions being so framed that their successful answering involved processes of generalizing. The author reports that an examination of the answers furnishes a concrete picture of the characteristic generalizations of children. The rate of improvement with age varies greatly in the different generalizations; the averages indicate that ability to generalize almost doubles during the years from ten to fourteen inclusive.

Fox (13) reports that he endeavored "to demonstrate the importance of imageless thought," and that his endeavor was crowned with success. Sentences were read aloud to fifteen observers (only one of whom was found to be dominantly motor!) who were subsequently asked to furnish introspective descriptions of the process of understanding the meaning. The author is convinced that understanding is possible without imagery, but that (relevant) imagery tends to make its appearance in cases of delay or conflict in consciousness, *i. e.*, when the observer disagrees, doubts, suspends judgment, and the like. In an investigation of the relationship between visual imagery and thinking, Miss Martin (29) presented visual figures, and subsequently asked her observers to reproduce their visual images of the figures. It was found that the content of the observer's remembrance of the figure far exceeded the content of his visual image, and Miss Martin is convinced that this excess is to be referred to non-imaginal components. The value of the visual image depends not upon the information which it furnishes, but upon the fact that it supports the attention, illustrates and reinforces non-sensory thinking, furnishes a feeling

of certainty, and constitutes a core around which non-sensory thinking accumulates. The visual image, then, is not essential to thinking but is merely incidental, and in many instances the image is the product of non-sensory thinking. Miss Town (58) reports an experiment in which six blind individuals and six normal individuals were tested as to ability to spell backwards and ability to recognize words when spelled backwards. The tests show a slight difference in favor of the seeing group, both as regards time and errors. It turns out, however, that vocal-motor factors (and not visual imagery alone) played an important rôle in the tests. The author concludes that the tests in question have little or no value as objective tests for the diagnosis of visual imagery, and that visual verbal imagery assists the process of spelling rather through its attribute of relative spatial position than through its attribute of form.

Miss Mulhall's experiment (31) aimed to determine whether "the person who is a good judge in one situation is also a good judge in another"; "whether the individual who is consistent in judging one situation is also consistent in judging another"; and "whether the most consistent judge is the best judge." Thirty-four persons were asked to arrange a series of weights, photographs, propositions and specimens of handwriting on the basis of heaviness, kindness, belief, and legibility, respectively; and from a comparison of the various arrangements the author concludes that "there is no such thing as general judicial capacity," that individuals who are consistent in judging one situation are not necessarily equally consistent in judging another situation, and that the correlation between judicial capacity and personal consistency probably varies with the objectivity of the judgments.

In Finkenbinder's investigation (10) an attempt was made to determine what mental contents are involved in the remembering of logically related data. The materials were mathematical and other problems which were solved by the observer. After intervals varying from a month to more than five months, the observers were asked to recall both the problems and the solutions, and to furnish introspective descriptions of their mental procedures and their mental contents. An examination of the introspections showed a striking similarity of procedure and of content in the eighteen observers who took part in the experiments, although certain typical differences were revealed. Visual images constituted about ninety per cent. of the total mental content of all remembrances,

even in cases where imagery from other modalities had originally been employed in envisaging and solving the problem. In the case of certain types of problems, however,—problems which had to do less with concrete objects than with turns of language and obscure meanings,—verbal imagery (auditory, vocal-motor and visual) tended to be present. The recall imagery first appeared in vague and schematic form but subsequently and gradually became more definite, detailed and meaningful,—its stability and non-conflicting character contributing to a feeling of certainty. Processes of reasoning which had been employed in solving, were seldom remembered (after an interval of a month or more); and they were never recalled in other than imaginal terms. The observers discovered no memorial content which could not be analyzed into imaginal components.

Liebenberg (25) presented groups of five to twenty-one dots tachistoscopically, and asked his observers to estimate their number and to furnish an introspective description of their procedure. It was found that small groups (up to about seven dots) were usually estimated correctly, while large groups were over-estimated, the estimates showing a preference for certain numerals. The procedure employed in estimating was analytic, especially at the outset. A general impression of 'many' was followed, during the presentation, by an accurate apprehension of a certain section of the group; then after the presentation the estimate was formed by means of certain criteria, such as position and extent of group, general impression, number observed to be present in the part-group; and this estimate was finally brought into relation with the general impression. In later sittings the procedure became abbreviated, a particular numeral associating itself directly with a particular impression of size of group. The author differentiates two types,—rapid, mechanical estimators, and slow, cautious estimators.

The phenomenon of sensory contrast or 'physiological contrast' has long been familiar to psychologists in the domain of vision, temperature and elsewhere; Flügel and Rivers (11) call attention to an analogous phenomenon, in the higher mental level of estimating, judging, and recognizing, which they call 'psychological contrast.' The stature of the average man is over-estimated when he stands beside a dwarf, and under-estimated when he stands beside a giant; familiar objects and scenes seem altered when we return to them after an absence; and illustrations of the same principle may be

found in the domain of moral and æsthetic judgment. Psychological contrast may be defined as the influence exerted on our judgment of the quality of an object by our experiencing other objects of the same kind but of different quality,—the influence being in the direction of an apparent amplification of this difference. The authors report a series of experiments which show that contrast-stimuli or contrast-situations make themselves felt in one's estimates of weights, of lengths of lines, of sizes of angles, in one's recognition of colors, and in one's judgment as to the rapidity of auditory and visual stimuli.

Reichardt (44) investigated the process of comparing remembered objects,—colored triangles of different forms and sizes serving as his materials, and an interval of about five minutes being allowed to intervene between presentation and comparison. The accuracy of comparing was found to depend upon the degree of completeness of the learning and upon the momentary condition of the observer; the accuracy decreases progressively with the lapse of time. Certain observers tend to over-estimate objects after a long interval, while others tend to over-estimate those which have but recently been presented. In the process of learning the size of the triangle, the observers resorted to various expedients: They applied verbal designations; they applied an ideated measuring-rod; they noted sizes of the surrounding regions; they attempted to remember the absolute size of the triangle; they attempted to compare the present triangle with other triangles of the series; and in the subsequent act of comparing, these various criteria were employed. The impression produced by the general form of the triangle (its slenderness, or its stoutness, etc.) plays an important part in the process of comparing; the judgment was frequently made in terms of absolute estimate rather than in terms of comparison.

Gemelli's monograph (17) contains a detailed analysis of the process of comparing cutaneous distances. The total process contains five stages: a preparation and *Einstellung* of the observer; an estimating of the standard stimulus; a pause; an estimating of the comparative stimulus; and a formulating of the judgment. The preparation consists in a specific orienting and adjustment of the observer; when the signal is received he takes up a definite attitude toward the experiment, envisages the *Aufgabe*, and turns his attention in a particular direction. This is followed by a state of tension and expectation. During the progress of the experiments

this preparation-stage tends to become abbreviated and mechanized, but its influence is evident throughout. The second stage,—the estimating of the standard stimulus,—is characterized by an equally active but a distinctive process. Here again a definite *Aufgabe* is present, but it gives rise to a different procedure in different individuals. Certain observers attend especially to the sensory attributes of the stimulus and attempt to envisage it in schematic or symbolic form, while others fixate successively the terminal points of the standard distance and attempt to bring them into some sort of relation with one another. During the pause which ensues (third stage) the observer tends to turn back in memory to the standard stimulus and to look forward toward the comparative stimulus which is about to be presented, with a definite preparation and *Einstellung* for the act of comparing. The fourth stage,—the estimating of the comparative stimulus,—is of paramount significance; Gemelli here distinguishes four different degrees of facility of estimation and facility of apprehension of relation between standard and comparative stimulus. In the final stage the judgment is formulated and reported by the observer; and this stage, too, proves to be exceedingly complex, especially in the earlier stages of the experiment. Gemelli discusses the determining tendency of the *Aufgabe*, and its influence upon the disposition of the observer.

Rahn (43) points out that the static structural element is an artifact which owes its origin to a philosophical and unwarranted distinction between faculties of sense and of understanding. Psychologists have wrested sensation from its setting in experience, and then they have attempted to derive experience from it. The difficulty of this task has impelled certain recent writers to postulate imageless thought as a new structural component; but the advocates of this doctrine are quite as culpable as the sensationalists. The difficulty has been due to a failure to appreciate the fact that sensation as it really exists *in situ* is always under the domination of some purpose; sensation always functions, and it can not be understood apart from its functioning. The difficulty can be avoided only by revising the doctrine of sensation, and by recognizing that sensation is not an ultimate of stable character but is a development within the experience of an individual. The attributes of sensation do not appear in differentiated form until the individual reacts in discriminating fashion; and the ultimate for any individual experience is that to which the individual reacts. Structural

analysis is legitimate only if when we analyze an experience into its components we mean that the objective stimulation and the cortical excitation functioned as a unity in the experience in question, and functioned in such a way as to furnish that experience with the attitude of doubt or the unified perception or whatever other content was present in the experience. This being so, the added structural element is gratuitous.

Müller-Freienfels (32) describes three essential characteristics of perception: A selecting or accentuating of certain parts of a situation; a peculiar awareness of activity; and a typicalizing (in virtue of which the perceived content is apprehended not as an individual but as representative of a type or species). Each of these three characteristics is of motor and affective origin,—the selecting results from a motor reaction which in turn engenders feelings; the awareness of activity is analyzable into kinæsthesia and (as ‘functional attention’) it enlarges the perception, endows it with affective toning, with emphasis and with value; the synthetizing, generalizing and typicalizing is due not to association and assimilation but to feeling and to *Stellungnahme*. When a typicalizing perception is fixed by means of a name we have a concept,—as is shown by the fact that few can apprehend the typical when no name can readily be applied to designate it. The function of judging is already present in the act of perceiving; it is a formulating of the perception in words or gestures. The essence of judging consists in acting, which may, however, be either reflex (released by an *Affekt*) or volitional; and the concept is an automatic speech-reaction to a perception, which it serves to formulate.

Ribot’s book (45) contains four re-published essays, two of which discuss the latent rôle of motor images and the problem of imageless and wordless thinking. The author holds that motor components of consciousness are relatively stable and resistant, and that they constitute the skeleton of consciousness. It is this skeleton or this motor residuum of affection and intellection which furnishes the unconscious substratum. Proceeding thence to a discussion of imageless thinking, Ribot points out that the hypothesis of a pure thought which is devoid of images and of words is neither probable nor has it been proven. Imageless thinking is to be regarded as an ideal limit which thought may approximate by successive rarefactions; if the limit were actually reached thought would be impossible. Imageless thought may be the product of an unconscious activity which involves residual motor processes.

Selz (51) employed the method of controlled association, with seven variations of *Aufgabe*, in an attempt to determine what factors direct the course of mental processes in thinking. His observers reported two sorts of content to which Selz attached chief importance: a sense of fluency of occurrence of stimulus-word; and a vague knowing of the relation demanded by the *Aufgabe*. (Knowing is an actual or dispositional consciousness of the specific relatedness of objects.) These two sorts of experience are to be regarded as the actualizing of a *Wissen*-disposition which was already present in the observer. The author's results emphasize the importance of 'direction' in thinking, and lead him to replace the constellation-theory of reproduction in orderly thinking by a theory of directed complex-integration (*determinierende Komplex-ergänzung*); this latter theory holds that the reproductive completion which takes place when a few terms of a complex are given is not due to constellation-units but to inherent complex-activity. The actualization of knowing which proved to be so significant in the solution of his experimental *Aufgaben* is to be regarded as a special case of complex-completion from an initially given portion of the complex with a knowing of the relation involved. And the completing of the complex is mediated by this consciousness of relation,—a consciousness which is unanalyzable and which is itself a schematic anticipation of the complex. The dispositional knowing whose actualization furnishes the solution is aroused by the *Aufgabe* and the awareness of the goal. This latter is describable as a searching in a determined direction, together with a consciousness of relation,—the latter furnishing the point of departure for progress in a specific direction.

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MEMORY, CONCEPT, JUDGMENT, LOGIC (THEORY)

BY W. C. GORE

University of Chicago

By insisting that in logic it is a waste of time to deal with inferences concerning particular cases, logic having to do throughout with completely general and formal implication, Russell (8) seems to remove logic from all psychological considerations, or at least from the province of actual thinking, if we assume that thinking is always specific, that it deals always with some particular case, whatever else it may be. Yet part of the importance of the book lies unquestionably in its psychology, in its belief in the practice of methodological doubt to break the dominion of habit, and in its demand that philosophic thinking shall limit itself on the side of what it may know and at the same time strive to develop fertility in imagining abstract hypotheses. The revolution in logic which the book signalizes is, in part, the recognition that the old logic of the classical tradition sought to legislate on the basis of a comparatively simple hypothesis as to what the world *is*, whereas the new logic aims to liberate the imagination as to what the world *may be*.

In place of the projected fourth volume of the work on "Thought and Things," Baldwin (1) has written an independent book as an outcome, or sequel, to his "Genetic Logic." Three types of logic

are distinguished, (1) the "logician's logic," which gives to logical principles an absolute and unconditioned value apart from the material of knowledge to which they may have application, (2) the "metaphysicians's logic," which conceives of logical principles as objectively existing, as reified, and (3) the "knower's logic," or genetic logic, which is developed from a more primitive, instinctive, emotional level, which marks a socialized form of concrete control, a community of interests, and which subsequently breaks from this partial and static level to undergo further development as the logic of fine art, answering to the cognitive and formal principle involved in beauty. Thus logic, but a logic of feeling, enters into the pancalism with which the genetic philosophy culminates.

Woodworth (11) offers a theory in explanation of "imageless thought," the basic idea of which is that "imageless thought" is an inner reaction to sensation, appearing as an image, not as an emphasis on the pattern or meaning residing in the given sensation, but "something new," not present in the sensation, but distinct from it, as the motor reaction is.

Dunlap (5), having observed that muscular contractions are regularly concomitant to the thought processes with which they occur, has framed the working hypothesis that muscular activity is involved in the condition of all thought, and the further and supplementary hypothesis that this form of present content (muscular activity) is that which is actually observed by those who report "mental images." He contends that the image as a copy, or reproduction, or pale ghost of former sensation does not exist. The content of thought or imagination actually present is in each case a muscle sensation, or a complex of muscle sensations. As a corollary, Dunlap holds that neither does "imageless thought" exist. The doctrine of the subconscious also receives a new interpretation. In many cases the muscular contractions themselves escape attention. This may be the general rule when we are thinking. The final arcs of the series may arouse consciousness and bring before it the result of unconscious reasoning or reflection. In every case, the muscle sensation is the true "image."

Müller-Freienfels (7) in a comprehensive review of recent tendencies in the study of memory is especially critical of the associational psychology involved, with its tendency to ignore important aspects and factors in memory, such as feeling, emotion, motor and constructive elements.

Lewis (6) has developed a new and more comprehensive calculus

of propositions, which he calls "the matrix algebra for implications," the consequences of which are believed to be important not only for logic but also for epistemology and metaphysics.

De Laguna (4) points out that the postulates of deductive logic stand upon a different footing from those of geometry. For deductive logic the *interpretation* of the symbols is prior to all else; hence, it is impossible for deductive logic to cut itself entirely loose from the external connections of common language and its consequent uncleanness. The two postulates of the principle of deduction and the principle of substitution are discussed as illustrative cases.

Schweitzer (9) conceives of the logic of mathematics as essentially genetic, as the logic of a science of discovery, in the service of which working hypotheses are developed and made to function as instruments of discovery as in other genetic sciences. In support of this, itself a working and mediating hypothesis of comparison, Schweitzer draws upon a wide range of evidence, both from mathematical and philosophical sources.

Social aspects of conceptual thinking are discussed by three writers: Boodin (2) includes a treatment of conceptual interpretation, proceeding from James' functional psychology of the concept and of reasoning. But Boodin holds that James had not completely liberated himself from the old solipsistic psychology in making the concept the function of "private ends." Membership in a social community, participation in the discussion and exchange of experiences, as Plato realized in the dialogue, furnish indispensable conditions for the development of concepts, which in becoming science, as an institution, afford the clearest sort of illustration of division of labor consequent on coöperation in an interpretative task. Weeks (10) dwells on the meance to thought of socially centralized intelligence, "scientific" management, elaboration of details, complexities of life that make for simplicity of mind; and he emphasizes the importance of assuring to every individual insistent and varied problems as stimuli to the exercise of the higher processes of thought. Carlyle (3) concludes that it is the concurrence of various individuals as regards information furnished by our senses which seems to be the main ground of the unquestioning acceptance by common sense of the belief in the external world. The recognition of this concurrence is possible only through intercourse, which is, therefore, the source of the most elementary and fundamental principle of our knowledge.

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VOCAL FUNCTIONS

BY W. V. BINGHAM

Carnegie Institute of Technology

For the most notable contribution to the study of Vocal Functions made during the year 1914, we are indebted to Miles (11). He has answered the question as to just how accurately people can sing when they undertake to reproduce the pitch of a standard source of sound; and he has found how this accuracy varies with an approach to the limits of the voice's range, with changes in the intensity and in the timbre of the standard tone, with differences of volume of the voice, and with the use of varying vowel qualities. Only on this last point are Miles's results disconcerting. The researches of Berlage had not prepared us to learn that the higher the formant in a vowel clang, the higher that vowel is sung. Within a moderate range, high tones are sung relatively more accurately than the lower tones, as would be expected from what is known about pitch discrimination. Men and women sing in their respective ranges with equal accuracy as measured absolutely, in vibrations.

These and other generalizations are based upon forty thousand measurements made on two hundred adults. Only the use of Seashore's Tonoscope (15) would render feasible such an amassing of data and compilation of norms. Miles's paper ends with a set of recommendations regarding a standard test of the ability of the voice to reproduce pitch and to produce voluntarily small changes in pitch.

Although this year has produced no volumes on speech defects comparable with those of the immediately preceding years, good material is found in "An Experimental Study of Stuttering," by Fletcher (6). This student in the laboratory of Clark University brought to his investigation a better psychological training than Bleumel's, but his writing lacks an assurance born of extended research and practice with stutterers, which one expects from specialists like Gutzmann, Scripture, Froeschels, or Stevenson Smith. Fletcher's nine subjects were not trained in introspection; consequently he lays most stress upon that portion of his research which resorted to objective methods, pneumographic, plethysmographic, and galvanometric. Records of the physiological phenomena of stuttering exhibited typical incoordinations of breathing, voice, and articulatory mechanism. These, however, did not seem to reveal the essential features of the phenomenon, because instead of being uniform they were indefinite in character and exceedingly varied. The presence of certain states of mind, on the other hand, seemed to be constant accompaniments of stuttering, and lead the experimenter to a study of these topics: emotions of anxiety, lack of confidence, and so on; "attitudes" of awareness of one's audience, or of expectation of stuttering; absence of clear anticipatory images of necessary speech movements; inordinate concentration of attention upon the speech act; the "aufgabe" consciousness of the stutterer, the realization of his responsibility for speaking; and finally, the share of associative mechanisms in causing the stutterer's inhibitions. The evidence which the author adduces in connection with this psychological portion of his study is largely anecdotal rather than experimental.

Morrison's (12) study of the speech defects of children in the kindergarten and first year of the primary school reminds the reader how frequent are the connections between speech defects and remediable physical defects. It also shows that vast improvement can sometimes result from even a little speech training when it is resorted to at this early stage of school life.

The amassing of children's vocabularies goes on apace, particularly here in America (1, 2, 3, 4, 17). In Norway, Eng (5) resorts to association reactions to learn the nature and prevalence of the abstract and general concepts with which school children's minds are stocked. In Hamburg and Berlin, the phoneticians continue to pursue elusive laws of intonation (14, 18) and of clang character (8, 13). Echoes of the Rutzian controversy persist (7, 16). From many fascinating contributions to *Vox*, one written by a teacher of the deaf and dumb is selected for mention in concluding this review. Lindner (10) found it most difficult to train his pupils to the correct use of the s-sound, ubiquitous in German speech, until he hit upon the idea of making the sibilant visible to the deaf speaker by means of the sensitive flame, familiar to the physics lecture table. The flame burns straight and tall except when the air is aquiver with a hiss; then it promptly foreshortens.

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SPECIAL REVIEWS

Physical Growth and School Progress. A Study in Experimental Education. B. T. BALDWIN. Washington: Govt. Print. Of., 1914. Pp. 212. (U. S. Bur. of Educ. Bull., 1914, no. 10. Whole Number 581.)

Within the first two years after birth the number of cells forming the human body reaches or nearly reaches the limit characteristic for the species, and later growth becomes a matter of cell enlargement mainly. It is with this second phase of growth that Baldwin is dealing, his records being for children four to eighteen years of age. This fact should be kept in mind in making an interpretation of the results.

The problems treated are the form and variation of the individual growth records for height, weight and lung capacity; the occurrence of retardation, precocity and departure from type in growth and the relation of these variations to school work as shown by school records.

In addition to the treatment that such data necessarily demand, there is given an interesting historical outline on the rise of physical measurements, with a summary of the main conclusions, and also a good annotated bibliography, comprising three hundred and thirty six titles. The peculiar value of this contribution lies in the fact that by dint of persistent industry the author has gathered, tabulated and collated data from the records of the elementary and high schools of the University of Chicago, from the Francis W. Parker School of Chicago and from the Horace Mann School of the Teachers College of Columbia University, and has thereby obtained an unusual series of measurements in which the observations apply to the same individual at successive ages. Data of this sort have been much desired for, with the exception of a few rather limited series presented by Wiener, Camerer, Peckham and one or two others, such data have not been available until the publication of these extensive tables by Baldwin. As always happens the new data permit the handling of questions previously more or less out of reach and Baldwin has made use of the opportunity thus offered.

Touching the material used, it is to be recognized at the start that children in all of the schools mentioned belong to a social group living under distinctly favorable conditions and it is therefore not surprising that the values for the physical characters run above those obtained by other students of American children who included less favored groups in their series. It follows of course that the status of any individual in respect to a given character must be determined by reference to the mean of the group to which he belongs and not to that of some other group.

Following this method Baldwin finds for both boys and girls that those above the median in height, weight and lung capacity enter on the phase of accelerated growth earlier and reach the period of arrest sooner, than do those below the median. Thus the physiological maturity of the larger children is attained earlier than that of the smaller. Moreover in girls the age of the first menstruation is closely correlated with the general physical development, appearing earlier in those girls in which this development is more advanced. It follows therefore that the wide range in age (11-16 yrs.) at which the first menstruation takes place does not represent a fluctuation in the appearance of this function in girls of the same physical development but a variation closely connected with the rate of that development.

Further, the graphs for height and weight show that within the ages studied ($6\frac{1}{2}$ -18 yrs.) the individual tends to maintain his relative position. Thus those above the median in their early years tend to remain above the median and vice-versa. Such arrests of growth as occur are most marked in the adolescent period, and though the common diseases of childhood do not have any permanent influence, adenoids do retard growth.

In addition to the physical data from which the foregoing conclusions have been drawn Baldwin has determined the average school-marks for forty-two boys and forty-six girls from the Horace Mann School and for twenty-six boys and twenty-one girls from the Francis W. Parker School, a total of one hundred and thirty-five individuals for each one of which the physical measurements are also at hand.

A number of interesting relations appears when these two sets of data are collated. In the first place in the elementary grades the average marks for the girls are above those of the boys in both schools and in every grade, without exception. Further among both boys and girls those of the normal school age or younger

maintain a better school standing both as to grade and mark than those over age for grade.

The explanation of this lies in the advanced maturity of the more successful pupils for those whose physiological age is accelerated complete the last grade of the elementary school at twelve years, nine and five-sixths months with an average mark of 84.35 while those retarded in physiological development do not complete the work until they are thirteen years, seven and four-thirteenths months of age and with an average mark of 81.72.

This conclusion is in accord with those of Porter, Christopher and Gratsianoff, but in connection with it the opportunities for misinterpretation are numerous and the author warns against confusing brightness or precocity with stages of mental maturity.

Why accelerated growth and success in school work should be thus correlated has yet to be explained. Since unfavorable conditions retard growth in both man and animals, it may be inferred that the acceleration in question indicates distinctly favorable conditions while at the same time it is to be remembered that the vigor of the organism is also a variable factor.

The children here studied are given their position in the group at an early age (before 6½ yrs.) and generally maintain this position during the entire period of observation.

The problem of the large and small child with its consequences arises therefore early in life, although even at that time cell enlargement has become the main method of growth.

What the impulse to cell enlargement is we do not know, though the studies of Osborne and Mendel show that under special conditions diets with certain definite chemical deficiencies may retard or arrest growth or even cause a loss in weight, the normal growth process being resumed when the particular deficiency in the diet is made good. On the other hand we may fairly assume individual differences in the efficiency of the organism which make one individual able to utilize a given diet better than another does, and thus grow more generously.

At present a more precise explanation is hardly warranted. While it is beyond question that hormones from the gonads modify the activities of the nervous system during adolescence there is no reason to regard the accelerated growth of the body at adolescence as a consequence of the development of the gonads. Within the age limits here taken, school standing as represented by grades may be considered as an index of those changes in the nervous

system which accompany the maturing process. Moreover the same conditions which favor growth also favor a smooth running of the mechanism which in turn finds expression in school marks.

The interesting difference between boys and girls in the matter of school marks invites a word in this connection. This difference is probably the result of several influences and conditions, in part social but in the main represented by the general precocity of the female during this period of her development.

Baldwin has not only presented his data in a way to make them useful to others but has used them so as to draw conclusions on a number of questions touching the growth of children. Among these questions by far the most important are the relation of the period of acceleration to physical growth and the positive correlation between height and weight, as indices of physiological maturity, and school standing, and the importance of his conclusions on these points depends on the fact that they are based on this valuable and unique series of individual records. HENRY H. DONALDSON

THE WISTAR INSTITUTE

COMMUNICATION

In the latter part of April I sent a set of questions on terminology to approximately 120 American psychologists. I made up the list by including all members of the American Psychological Association whose professional degrees are dated 1902 or earlier, and adding several names of those who, although not having a professional degree, legitimately belong in the group to be considered. The chronological method of selecting the group seemed to me the least open to objections, for persons who have been teaching or discussing psychology for twelve years or more may reasonably be expected to have emerged somewhat from the influence of their teachers and to have developed definite notions as to the significance of the terms they use.

I requested replies by May 15, as I hoped to compile the results during the summer months. A large proportion of those addressed have replied, and it is clear that the results of the questionnaire are to be very important. Returns have been coming in rather slowly, however, and it seems advisable to defer the compilation until fall. I request, therefore, that those who have not sent their replies will do so as early as possible, in order that the compilers' labor (which will be heavy) may be completed before the Christmas meeting.

KNIGHT DUNLAP

JOHNS HOPKINS UNIVERSITY

NOTES AND NEWS

THE August number of the *BULLETIN*, dealing with comparative psychology, was prepared under the editorial direction of Professor W. S. Hunter, of the University of Texas.

DR. H. S. LANGFELD, of Harvard University, has been promoted to the grade of assistant professor.

THE Board of Trustees of George Peabody College for Teachers has announced the gift of \$8,500 from Miss Eleanor Cuyler and Mr. Thomas De Witt Cuyler to be expended for furniture, equipment and publications for the psychological laboratory.

A LIST of members of the teaching and scientific staffs of universities, technical schools, etc., of the United Kingdom with the British army is given in a recent number of *Nature*. Among those who are thus engaged are C. S. Myers, lecturer in experimental psychology in the University of Cambridge; G. H. Turnbull, assistant lecturer in education in the University of Liverpool; W. Brown, reader in psychology in King's College, London; F. Aveling, lecturer in synthetic psychology, and C. Spearman, professor of philosophy of mind and logic in University College, London.

ARRANGEMENTS are being made for the Second Pan American Scientific Congress to be held in Washington, December 27, 1915, to January 8, 1916. Membership is limited to representatives of governments, universities, scientific societies and bodies, and to other specially invited guests. It is understood that a general invitation to participate will be extended to members of the American Association for the Advancement of Science. Psychologists will be interested in sessions of Section I (Anthropology), Section IV (Education), and Section VIII (Public Health and Medical Science). Information regarding promised psychological papers will be given later, but it is expected that they will be mainly those relating to mental hygiene and to abnormal psychology.

THE
PSYCHOLOGICAL BULLETIN

GENERAL REVIEWS AND SUMMARIES

CHILD PSYCHOLOGY AND PEDAGOGY

BY KATE GORDON

Bryn Mawr College

The scientific study of the mental life of young children has a special difficulty with which to contend. The animal psychologist may gather his specimens in quantities and do with them what he will, and the student of older children or of adults finds them in schools and colleges, and finds them capable of undergoing systematic investigation. But young children are normally found in individual homes where they must be observed rather than experimented upon. This means that child psychology must be built up in part by isolated, sometimes by untrained observers. Moreover, many of those who know children best publish books of a practical nature in which the reader is left to sift out the psychology from the pedagogy if he is so disposed.

Treatises.—Among recent books which are general in scope is that of the Gesells (13). Several of the chapters in the more purely psychological part of the book are excellent, especially the ones on "The Hand" and on "Touch." In the part entitled "The Pedagogy of the Primary School" there is also psychological material. These chapters, notably those on Drawing, Dramatic Expression and Handwriting, contain a great deal of good sense and enlightened opinion. A number of original devices are presented in connection with the different subjects of the curriculum. Thus the rhythmic movements preparatory to writing seem particularly well planned. A work much more pretentious in title is Jacoby's (18) which is professedly written for educators, to give them a knowledge of those subjects which border on both medicine and

pedagogy. The book should be stimulating to the lay reader, and is not without value for the teacher. Some specific points are given for the diagnosis and treatment of feeble-minded children. Still, the treatment of topics is, on the whole, far too cursory to entitle the book to consideration as a real contribution to a scientific pedagogy. Hallam's (15) studies of child development is a simple, direct little treatise. It does not purport to offer original material, but is an adaptation of reliable results to the use of mothers' and of child study clubs. It seems admirable for such a purpose. Hillyer's (17) book is a program of specific drills. It gives little of psychological discussion or pedagogical theory, and that little is not always sound. The spirit of the book is illustrated in exercise 19 (p. 32) which reads: "Scatter waste paper, blocks, toys, on the floor and have the children pick them up, put paper in scrap basket, and blocks, etc., where they belong." As a kind of reference list for games and maxims it is not without use. Stoner's (33) is a much talked about book and a delightful one—the account of Mrs. Stoner's training of her daughter Winifred. To its documentary interest is added much in the way of general discussion. This child's unusual accomplishments seem entirely credible as one realizes in reading the book the mother's very uncommon resources of tact, patience and imagination. Mrs. Stoner's book is as remarkable for its common sense and sanity as for the experiment in child training which it records. Barnesby's (2) is the work of a physician who offers a brief manual of practical suggestions for the early care of children. It gives important elementary instruction on symptoms of children's diseases, and contains chapters on Eugenics and on School Inspection. It is not primarily a book for teachers but is one that a physician might wish to put into the hands of a young mother. McKeever (22) publishes a text-book for parent-teachers' associations, mothers' clubs and like groups. He discusses matters of organization and direction of such groups, but so far as child psychology or pedagogy are concerned the book is indeed all outline. McCracken (21) gives, with literary finish, a series of anecdotes about children in their home life, school life and church life. Hers is not in any sense a technical book, and yet its incidents may be taken by the psychologist, if he will, as so much protocol.

The Montessori Method.—The continued interest in the Montessori ideas has produced a number of new books and articles. Stevens (32) gives a faithful presentation of the Montessori prin-

ciples and spirit. In her own trial of the didactic materials, however, she cites an experience which suggests a crucial criticism of the method. "John," she writes (p. 221), "would choose the Tower, Big Stair, or Long Stair, but wished to use them in his own way to build a railroad track or a train of cars. Only gradually did he use them intelligently." Whether this misappropriation of John's is to be permitted or suppressed is an important point in the interpretation of the Montessori principle of freedom. Mrs. Stoner, in the above quoted book, predicts that the Montessori system will not last because it fails to encourage such imaginative play. On the other hand Miss Sayre (30) reveals surprising possibilities for artistic activity in the use of the geometrical insets. She describes the artistic value of the Montessori geometrical insets and the stages by which a class of children arrived at free-hand drawing. One day a child designing at the board with the oval inset cried out, "I've drawn a tulip." "A great deal of interest was now manifested in the portrayal of various flowers by means of the insets. It was imagination that supplemented the material, for the children had not thought of using a real flower as a model." A child brought a bunch of magnolias to school and several others wanted to draw them. "One studied the shape of the petals and selected the ellipse, another the oval, while a third child used the spherical triangle and being dissatisfied with the result erased the flower and *drew it free hand.*" Boyd (6) traces the history of some of the Montessori principles from Locke. He finds, for example, that the work of Pereira in training deaf mutes suggested to Rousseau the idea that these methods of educating defectives could be extended to the training of normal children. He criticizes the education of the senses as follows (p. 237): "Misled by psychological analogies and by the practice of the psychological laboratory, Montessori assumes that the senses as the simplest elements of mind come to an early perfection in individual development, and interprets the child mind as though it were dominated by its sensory experiences." Boyd also finds the system lacking in "direct esthetic and moral appeal to the child." Ward (35) gives a clear and detailed account of the Montessori system in operation. She may be called a "follower" although her book is more than a mere exposition. It compares the work of Montessori with that of the American Kindergarten, and the book is enriched by references to other pedagogical writers. On the whole the keenest and clearest appraisal of the system in its psychological implications is that of Kilpatrick (19),

who concerning sense training concludes: "The training got with each of the several pieces of the didactic apparatus is genuine, but highly specialized, and along lines for the most part so removed from ordinary life conditions that the probability of its functioning directly as skill is very remote." His general comment is "Stimulating she is; a contributor to our theory, hardly, if at all."

Child Hygiene.—The field of child hygiene has been notably enriched by Terman (34), who has digested and represented in more usable form a great deal of medical and pedagogical research. There are chapters on general laws of growth and disorders of growth, followed by chapters on more special fields, as the teeth of school children, hygiene of the nose, throat, ear, etc. One of the most interesting parts treats of the sleep of school children. Noyes (26) publishes a mother's diary of her child's first two years. Records of nine critical months are presented in some detail, *i. e.*, months in which special problems like teething and weaning had to be met. Summaries and charts for the entire two years are given, including items relating to diet, sleep, excretions, etc. Also curves of height, weight, head measurements, girth of chest, neck, etc., are shown. It is a valuable and a readable little monograph.

Special Aspects of Child Psychology.—Of the articles bearing on special aspects of child psychology a large proportion is concerned with speech development. Several vocabulary studies are reported. Rowe and Rowe (29) give the total number of words used by their child as 2,346 at the age of four and 3,950 at the age of six. Heilig (16) gives a list of 2,153 for a girl of three years. He adds notes also on her musical development thus: "At fourteen months she sang the whole scale with absolute accuracy, alone and unprompted. From the fourteenth month she could strike at once with her voice any tone sounded on the piano." Bush (7) compares the vocabulary of a three-year-old girl with Whipple's boy of three. The girl's total number of words is 1,944 as against Whipple's 1,771. The percentages of various parts of speech to the whole vocabulary are fairly close to those recorded by Whipple but "the principal advantages the girl B has over the boy R seems to be in the use of verbs, she having a numerical excess of 115." Bohn (4) records the first use of sentences by a girl. The first which could be called a sentence, both in form and function, he says, came in the fifteenth month. The total vocabulary at 27 months was 969 words. Boyd (5) presents a classified vocabulary of a girl, the total number of words being 1,657 at the age of three years and 2,598 at the

age of four. Beyer (3) reports the vocabulary of a boy of two years as being 771 words. Drever (10) gives results for three children, a boy of $54\frac{1}{2}$ months with 1,712 words, a girl of 43 months with 824 words, and a boy of 28 months with 345 words. Snyder (31) gave special attention to sentence types. She found a large proportion to be imperatives. Many declaratives and interrogatives were also clearly imperatives in their intent. This child's definitions "gave the habitual activity or employment of a thing." The development of the negative confirmed the observations of Sully, Major, *et al.* Grant (14) gives curves of growth of a (girl's) vocabulary, up to her 26th month, the total being 1,201 words. The study includes a comparative table of vocabularies cited from some fifteen or so authorities. Nice (24) studied the vocabulary of a girl of three as determined by environment. "This child got her words at first largely from personal experience." The same writer, Nice (25), tells of a left-handed girl who was prevented from using her left hand until she was two years old. At that time she had showed no sign of talking and the attempt to make her right-handed was given up. The child learned to excel in the use of her hands and at the age of three and a half years showed a spontaneous and marked improvement in speech. Apropos of the point made by Ballard in "Sinistrality and Speech" (*Journal of Experimental Pedagogy*, 1912) Lippert (20) submits a very brief statement on three left-handed boys. All of them had learned to write with the right hand but none had any speech defect. Eng (11) has made a study of abstract concepts in the speech and thought of the child. She cites the observation made by others that the child's correct use of numerals is often restricted to some special objects, and she generalizes this observation, *i. e.*, she points out that this is what happens at first in the child's use of any abstract concept. She found children's associative reactions to abstract stimulus words to be nearly twice as long as to concrete words. She, furthermore, tested children ranging in age from 10 to 14 years, on their comprehension of abstract words in isolation and in context. She found that if a child did not know a word in isolation he was not likely to be helped much when he got it in context, though the influence of context increased slightly with the child's age. Mead (23), on the basis of returns from 25 boys and 25 girls, all normal children, says that "boys begin to walk at 13.875 months (using the median as a measure of central tendency) with a probable error of .97 months; and begin to talk at 16.5 months, with a probable

error of 2.75 months. Girls begin to walk at 13.21 months, with a probable error of 1.12 months; and begin to talk at 15.5 months, with a probable error of 2.68 months." Figures are also given for the feeble-minded.

Several titles referring to children's play should be mentioned. Folsom (12) writes: "My interest in things scientific seemed to develop in exactly the reverse of the recapitulatory order expounded by Dr. G. Stanley Hall. I was first of all interested in pure science—I wanted to know the facts and was irritated when the information was diluted with mythical, personal, or heroic interpretations." Day (9) gives the story of the geographical, political and industrial peculiarities of a boy's make-believe world. It shows how his imagination was colored by the practical and scientific character of his surroundings. It is not an account of a child's notion of deity, as the title might suggest. Reaney (28) found that "a definite correlation exists between general ability and play ability for group games." Parsons (27) calls attention to the fact that in nursery plays for boys the soldier ideal is too constantly and too exclusively held up and that "it is ever those earliest associations which are the hardest to sever, the most resistant to reason." She suggests that the ideal of the engineer, life-saver, fireman, forest ranger, etc., be substituted.

Watkins (36) tested 10 boys and 10 girls, 5 of each being "bright" and the other 5 "dull," upon their immediate memory for rows of nonsense syllables and of digits. He confirms other writers in that "the influence of perseveration and of regressive inhibition, whilst not in themselves indicative of backwardness, are, however, more marked in the case of backward than of intelligent children." Moreover, "intelligent children apprehend the row (of syllables) as a complex whole. . . . Backward children tend to learn each unit as isolated and almost as self-complete." Ballard (1) reports that "when a young child has imperfectly memorized a passage of poetry, he is, as a rule, able to remember more of it after the lapse of a few days than he does immediately after learning. . . . As a general rule, children of six years of age improve to the extent of 50 or 60 per cent. in two days, children of twelve improve from 10 to 20 per cent.; subjects over twenty years of age do not improve at all."

Cook and O'Shea (8) upon testing high school and college students in spelling, with a view to determine the value of knowing spelling rules, concluded that "not a single rule tested proved to

be of real value except the one . . . relating to the final *ie.*" They try to analyze the sources of poor spelling and also the characteristics of the good speller. The writers leave the impression that differences in imagery habits are unimportant. No one of their four principal subjects showed himself to be predominantly of one type. Such a number, however, is probably far too small to show any correlation between imagery habits and spelling capacity.

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ADOLESCENCE

BY BIRD T. BALDWIN

Swarthmore College

Treatises.—Several books of a quasi-scientific nature on the psychology and pedagogy of adolescence have appeared during the past two years in the form of texts for reading circles, teachers' associations and normal schools, and one of particular merit in this line is that of King (31) which gives an intimate first-hand appreciation, in an elementary and popular form, of the high school pupil's physical, social and mental characteristics with educational corollaries and directions for teachers, based primarily on good auxiliary literature and experiments by the author. Kelynack (30) has edited a small volume containing suggestive material on the psychology of youth and similar discussions on hygiene, recreations, disorders and habits. Forbush's (16) study of the adolescent boy in the

home is a new book of particular value to parents with special reference to institutes and boys' clubs, and this author's handbook for the members of the American Institute of Child Life (17) is a well-classified outline of annotated psycho-sociological and educational references on adolescence. In a comprehensive study of the origin and classification of children's clubs, Varendonck (55) has made a significant contribution to the study of the social instincts of adolescence. Fiaux (15) has published a good general treatise and Barnes (6) an outline of his lectures, of which several are on adolescence.

Experimental Studies.—From the standpoint of scientific contributions to adolescent psychology, with particular reference to the genetic aspects of physical and mental development, Woolley and Fischer's (58) monograph based on about 800 working children of fourteen years of age is of marked constructive value, since 679 of the children were retarded at the age of fifteen in height, weight, lung capacity, steadiness of hand, rote memory, association, completion of sentences, association of cause and effect, tapping, card sorting, substitutions, form boards and puzzle boxes. Positive correlations were found between school grade and each mental test with the range of distribution from the lowest to the highest, extending from the puzzle box, cancellation, substitution, sentence test and association of opposites to memory, respectively, which ranked the highest. An active laboratory force is at work in Cincinnati on these problems and similar work has been started in New York.

The most important source book in the psychology of adolescence that has appeared in the last two years is Healy's (21) large volume based on five years' study of 1,000 recidivists in crime (repeated offenders) from the Chicago Juvenile Court, averaging between fifteen and sixteen years of age. The point of view of the author is that of the medical man who has acquired psychological interest and training, with the center of orientation of a psychoanalyst. (For a *Literaturbericht* on Delinquency see Southard, E. E., in the PSYCHOL. BULL., 1915, 12, 268-270 and on Feeble-mindedness, Kuhlmann, F., in the PSYCHOL. BULL., 1914, 11, 193-202.)

Baldwin (2) followed the same group of children for from five to thirteen years in physical growth and school progress, and a retarded adolescent boy daily for two years (3). Heck (22) used the Courtis reasoning tests in arithmetic for determining fatigue and concludes

that normal, healthy children can meet the daily requirements of school without injury to their health; more is accomplished in the afternoon than in the morning but with less accuracy. Peters and Nemecek (45) tested 118 children ranging from fourteen to twenty-four years of age. They used a series of 105 stimulus words, and the subject indicated whether the association was pleasant or unpleasant. The emotional experiences predominated over the indifferent and the pleasurable ones were in excess. Eng (13) took as her problem on children between ten and a half and fourteen years of age: What is the effect of an abstract starting point on a series of associations? and found that the rate of response to abstract terms was twice that of the concrete, the interval decreasing with age. Evard's (14) experimental study of adolescence has not been accessible to the reviewer. Koch (33) finds the "average child" uses perhaps the same "time worn" (?) 8,000 words. In a short article on the age of loyalty and coöperative play, Reany (47) stresses the primitive instincts and the value of the Scout movement. McLaren (37) compared the Australian and German children as representative of national ideals and makes a well-supported attack on the German schools, which are grinding and oppressive, but he commends the thorough methods of instruction. This article has special reference to adolescent suicide as caused by parental suppression and scholastic competition.

The subject of coeducation during adolescence has received little attention in literature of late. Several preparatory schools in the eastern part of the United States, however, are differentiating the sexes during high-school age. In Germany Meumann (38) took up the subject of the pros and cons of coeducation and coinstruction under fifteen theses, and Nef (40), in a long and suggestive article, has discussed the possibilities of coeducation in the *Gymnasium*.

Misdirected Education.—Gillingham (18) made an individual study of a child's struggle to overcome difficulties arising from a number of complicated causes such as left-handedness and inability to grasp certain sounds, improvement resulting under a system that permitted advancement by subjects. Otis (41) reports on a temperamental girl of average ability but strong passions who, from lack of control and influence became unable to adapt herself to the normal conditions of life; and on (42) a morally deficient girl of good parentage but over-indulgent training; and on (43) a girl from a respectable middle class family, who, while mentally normal, was a so-called moral imbecile and was found by instruction

and association tests to be incapable of grasping abstract ideas. Catlin (10) has given an individual study of an incorrigible child and her treatment during a year. Williams (57), in a study of three delinquent and six backward Jewish children, concludes that the social service follow-up method enables the examiner to draw many conclusions that are not evident from a mere physical and mental examination. In a study of thirteen clinical cases, which were followed up after four years, Barnes (7) emphasizes the value of clinical recommendations especially in cases due to lack of parental control. Hinckley (23), in a six weeks' study of a deficient boy suffering from deafness and muscular incoordination, points out the effectiveness of certain psychological suggestions. Baldwin (4) made a study of a delinquent mute of poor parentage and bad environment and attributes the retardation primarily to suppressed emotions. From the standpoint of a social-psychological study of the lawless boy and neglected girl, True (53) gives a very careful survey of delinquency in urban communities.

Vocational Guidance.—Within the past two years there has arisen in this country a body of literature in a specialized field in the psychology of adolescence under the title of *vocational guidance*, in which teachers and psychologists, acting as counsellors, aim to determine a boy's or girl's capacities, characteristics, traits and dominant interests with a view of formulating criteria for anticipating the degrees of probable success in certain vocations or professions.

Kelley (29), in this connection, contributes from the standpoint of method a valuable monograph on the analysis and prediction of ability of high-school pupils. The essential contribution of the monograph is the method of calculating the correlations between the estimate of a person's fitness for a task, and his later performance in it. Puffer (46), who has given particular attention to the boy and his gang, has issued a book on vocational guidance which rests on the presupposition that "true education fits for life." Seven common vocations are discussed in detail, and the professions and vocational guidance as constructive social forces in general. Davis (12) published a book on vocational and moral guidance which attempts to outline methods by which the individual boy or girl may be led to determine his bent by means of outlines of classroom conferences for pupils from the seventh to the twelfth grades; and Brereton (8) emphasizes the influence of vocational guidance on character development. In Chapter XXIV of Johnston's *Modern*

High School (28) Bloomfield, who was active in initiating the movement four years ago, gives a method of approaching vocational guidance, and in the following chapter Ruediger calls attention to the need of avocational guidance. A timely little book because it deals with girls is that of Weaver (56), in which the author has endeavored to summarize the conditions of gainful occupations for women. Hollingworth (24) maintains that vocational psychology up to the present is a typical case of the method of trial and error and after outlining the methods of vocational miniature, vocational sampling, vocational analogy and miscellaneous empirical tests, he emphasizes the value of sustaining interest in the practical use of the psychological laboratory and the need of caution in too generous prophesying.

A report of the National Vocational Guidance Association, held at Grand Rapids in 1913, has been published by the United States Bureau of Education (54) and treats the subject in a comprehensive way from the social, economic and educational aspects, with special reference to application to the public school system. Among the papers based on general principles of educational psychology are those of Professor Mead, Mrs. Woolley and Mr. Ayres, who supplements his former review (1) and treats primarily psychological tests, calling attention to the work of Thompson, Münsterberg, Whipple, Ricker, Seashore, McMillan, and Lough. The Iowa State Teachers' Association's report (26) is based on a statistical and questionnaire study of school eliminations, the vocations open to boys in Iowa, the wages paid, the relative difficulty of obtaining employees, etc. From this data certain conclusions are drawn, namely, that educational guidance is the first step and, as a corollary to that, there is needed the vocational counsellor, who shall see that the abilities of each child are discovered, educated and utilized as far as possible. Butler (9) claims the past has proven our school system an expensive institution for the adaptation of the few to the conditions of life; we need reorganization with a view to vocational guidance and the use of industrial plants and laboratories. Righter (48) contributes to the data on this subject a type survey which calls for a preliminary study of the social and economic conditions in the community where vocational guidance is required. Claiming that the increasing tendency toward specialization as well as elimination of students before that time makes vocational guidance of grammar-school pupils advisable, Greany (19) gives an account of an experimental

course on vocational guidance including lessons on general occupations covering the general characteristic needs for success. King (32) treats the new movement for social efficiency and vocational guidance in a general way. Thompson (52) considers that psychological tests of vocational guidance are more useful for elimination than for evaluation of an individual's capacities. In the Boston schools each elementary school has two teachers acting as official vocational counsellors, one who deals with children leaving school for work, and the other who advises parents and pupils concerning the high-school courses. In the industrial schools the vocational assistants have a two-fold work, studying the situation and studying the pupil.

A practical pedagogical method of approaching the problem is to have persons who have obtained some degree of success lecture or hold conferences with boys and girls, with a view to helping them to see the advantages, disadvantages, and difficulties of the vocation or profession. Horton (25) presents the plan of vocational guidance in Mishawaka, which includes a vocational survey of the city; differentiation of courses for guidance purposes; collateral reading on vocational guidance in the English department of the high school; the use of assembly periods for talks on vocations by men and women in them; conferences with the eighth grade on the vocational value of the high school, and with the graduating class on their preferences. Hanus (20) emphasizes the fact that vocational guidance "does not mean prescribing a vocation; it does mean bringing to bear on the choice of a vocation, organized information and organized common sense."

Moral Education.—That an empirical course in morals centering around the general concept of citizenship and physical development can be formulated into a usable text for adolescents has been demonstrated to an unusual degree by Taylor (51), who has given a practical graded school course correlating lessons in general morals, citizenship, domestic science, physical training, vocational guidance and recreation. Johnson (27), on the later periods of high school, shows that if approached in the right spirit boys are thorough-going idealists who welcome a discussion of moral action. His informal conference methods of discussing habit, gambling, profanity, self-control, loyalty, club life, etc., show a first-hand sympathetic understanding and rare insight into the complex and interesting traits of adolescents. Sneath and Hodges (49) offer a book of the older, hortatory, moralizing type, laying emphasis

upon the indirect method of moral training through the school and home. McKeever (36) has produced several books for boys and girls of a moralizing but also of a practical type. Kuno (34), in a discussion of the physical, intellectual and moral characteristics of the adolescent boy, has attempted to show how the teacher may utilize these by indirect methods for the building of self-control in character. In a study of 425 colleges and universities Baldwin (5) finds that 125 institutions have a formal Honor System and the success of the movement is attributed in the main to the natural desire of the post-adolescent students to formulate ideals for themselves, the interest for co-operative activity and team work, and the pride involved in creating college public sentiment and college loyalty.

Adolescence and the High School.—Among the newer conceptions and aims of the high school Davis (11) emphasizes the necessity of making the high-school conform to the changes that occur during adolescence. A flexible program that gradually trains in the elements of choice, that gradually relaxes external authority and repression, and that increases powers of forming analyses, judgments, and volitions is recommended. Stout (50) lays stress on the social instincts of the adolescent as having marked bearings upon the function and organization of the ideal high school. Lewis (35) devotes chapters II and III to a semi-popular discussion of the high school and the boy, and the high school and the girl, illustrated plentifully by cases of the inability of the high school to meet the needs of the average boy or girl. In Monroe's *Principles of Secondary Education* (39) Whipple gives (in Chapter VII) a summary of the psychology and hygiene of adolescence with an application to formal discipline and intellectual growth during adolescence. In Johnston's *Modern High School* (28) are to be found several chapters bearing indirectly on adolescence. Parker (44) finds both the instinctive and habitual interests of adolescents of great importance in methods of teaching and his analysis of the learning processes in economical teaching rests on a more thorough knowledge of high-school boys and girls on the part of high-school teachers.

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EDUCATIONAL PSYCHOLOGY

BY BIRD T. BALDWIN

Swarthmore College

Texts in Educational Psychology.—The most significant contributions of texts in the rapidly growing experimental science of educational psychology during the past two years have been made by Judd, Meumann, Stern and Thorndike. In a vigorous, clear and scientific manner Judd (47) has helped blaze a new line of psycho-educational research in his text on the applied psychology of high-school subjects. In opposition to Hall's method of describing the mental traits of adolescents the author advocates an inquiry into the mental characteristics typical of each branch of learning pursued by the adolescent, which combines the principles of general and individual psychology.

In the psychology of the concrete subject of geometry, for example, the origin of space perception is traced as a relational type of consciousness for a basis only (since geometrical analyses involve different mental processes that are dependent on spatial perceptions) and the analysis of algebra is based on the psychology of number and abstraction. The psychology of language first received adequate treatment in Wundt's *Völkerpsychologie*, as a definite and important kind of behavior implying incipient motor reactions with general mental tonus. English teachers, through lack of motive and content, substitute form, specialization, rhetoric and dissection for appreciation, interpretation, and the expression of experience and findings. The psychology of skill includes writing

and industrial arts. Science is a body of generalized knowledge and the treatment is, aside from the discussion of laboratory methods, anthropological in method. The fine arts evoke inner reactions that are extraordinarily difficult to analyze and control and this in a measure explains their vagueness and consequent neglect in schools. In history the broad general educational principle is stressed and the author then takes up his analysis of "generalized experience" in which he finds no one advocating "formal discipline" in the extreme in which the opponents would have them, nor are they greatly at variance with Thorndike's "identity of procedure" and "identity of substance." No one denies the fact that there is transfer of training, according to Judd, and the real problem is that of degree of transfer, which he finds depends on the power of generalization. The formula of identical elements of experience is absolutely without value; if a subject does not give generalized training it is not the fault of the student's mind but of the method of instruction. The chapter aims to present a sharp contrast to the doctrine of "specialized mental functions" with particular reference to Thorndike's views.

Meumann's last volume (61) of his *Vorlesungen zur Einführung in die experimentelle Pädagogik*, in which he sets forth the experimental results in the field and their pedagogical significance, marks the completion of a masterly production in constructive education.¹ Stern (84) has given remarkably keen analyses and descriptions of child behavior from a psychological point of view from the kindergarten period up to six years, which is a contribution of permanent value in the field. The author's broad knowledge of psychology, his careful technique in giving mental tests and his sympathetic appreciation of the meaning of childhood are apparent throughout the book.

Approaching the subject from the point of view of a detailed study of original tendencies (reflexes, instincts and capacities), Thorndike (88) has condensed the material of his three recent volumes on educational psychology into the most scholarly, lucid, and best organized text we have under this title (87). The aim of education consists in perpetuating the original tendencies that change the individual for the better, eliminating, redirecting, or modifying others. The first nine chapters of the text consist of an analysis of the human tendencies, their characteristics, the extent to which they are modifiable, their anatomy, physiology and

¹ For special review see p. 400 of this number of the BULLETIN.

function. With an analysis of learning in animals as a basis, the next eleven chapters treat of learning in man with special reference to mental functions through associative learning, learning by analysis and selection, the amount, rate, limit, conditions, change, and the permanence of improvement in learning processes, with the effect and limitations of transfer of training, and the conditions of mental fatigue. The last seven chapters deal with the psychology of individual differences and their causes from the standpoints of race, sex, heredity, maturity and environment; on mental life in general and on single traits and combinations of traits in particular. In addition to the author's own source material the experimental contributions of 99 other investigators are cited in the text, and of these many have been associated with the author in working out their own particular problems. In the text, however, one finds the problems of individual differences in physiological age almost entirely neglected and a very brief account of the higher mental processes which necessarily form a large part of the teacher's work. This book shows a remarkable advance in the biological concept of the aim of education since James championed this general view a quarter of a century ago.

A second edition of Whipple's *Manual* (95, 96) has been expanded into two volumes in order to include the rapidly increasing number of investigations. Many pages show evidence of revision in order to include new literature and supplementary illustrations, charts and tables; the literature on the Binet tests has been omitted from the second edition. Approaching the subject historically, Anschutz (2) treats the psychology of the higher and more complex mental processes involved in *die Intelligenz*, with particular reference to graded mental tests and educational applications in their bearing primarily on the psychology of attention, judgment and reasoning. Hahn (38) has discussed the relation of experimental psychology to education. Valentine (92) has attempted to produce an experimental type of educational psychology text. Part I contains methods of giving experiments; Part II, under corresponding chapter headings, discusses the theoretical and practical significance of the experiments. Hollingworth's (42) experimental psychology has a number of good psycho-educational experiments.

West (94) has written a text from the English empirical point of view with some fundamental principles outlined in a coördinate manner. Some of Winch's (98) important studies have been issued in a monograph under the title of *Children's Perceptions*.

Eight series of experiments were conducted in schools with boys and girls and the results are tabulated with reference to the perception of clothes, position, activities, things, number, color, and to the development of perceptual attitude. Dumville (27) published a guide primarily for preparation for teachers' examinations and as an introduction to the subject of educational psychology which gives an account of some of the physiological traits in the development of the child mind. Magnusson (58), in an elementary and comprehensive treatment for normal school classes, approaches the subject from the biological and neurological points of view, discussing in turn the intellect, the instincts and feelings, subconsciousness, child study, and pedagogical applications of psychology. In a popular but sane and suggestive book for parents, teachers, and ministers, Gruenberg (37) treats child life intimately from the genetic point of view on the subjects of fear, instinct, imagination, will, reasoning, ideals, and social development. Klein-peter (51), in his comprehensive treatise, which includes discussions on fatigue, child and individual psychology, brings together considerable historical material and assembles data of direct educational import. The third edition of Offner's *Das Gedächtniss* (66), which treats primarily of the relation of experimental psychology to education, should be mentioned as a significant contribution to educational psychology, as well as the first, second and third volumes of Thorndike's (88) larger study in educational psychology, which have previously been reviewed in the BULLETIN. Schulze (79) has also issued a third edition of his experimental educational psychology and Wundt (101) a new edition of his *Einführung in die Psychologie*.

Strayer and Thorndike (85) published in 1913 a volume on educational administration including studies by advanced students on age and grade, promotion, retardation and elimination, individual differences among pupils of the same grade, and studies of the teaching staff. Wallin (93) has assembled, and supplemented, a number of his magazine articles into a volume which gives the history, distribution, purposes, and methods of psycho-educational clinics in this country. Swift (86) generalizes the results of his and other investigations and applies them to representative types of school work. He maintains that all education should be "learning by doing" and that the laboratory and workshop methods should be introduced into all subjects. Dewey and Dewey (25) have just published the best recent contribution on contemporary educational tendencies based on Professor Dewey's philosophy of

education and the psychological principles of Rousseau, Pestalozzi and Froebel. The book carries further the aim of education as set forth in *School and Society* and selects as "the schools of to-morrow" a limited number of "experiment stations." Though these schools differ among themselves, they represent the thesis—"To find out how to make knowledge when it is needed is the true end of the acquisition of knowledge in school, not the information itself." For students who approach educational psychology from the neurological point of view, Dunlap's (28) outline furnishes an excellent detailed guide.

Experimental Educational Psychology.—It is not possible at the present formative stage of educational psychology to differentiate clearly at all times experiments of educational import from those of pure psychology, since new and unanticipated applications are constantly being made.

Myers (65) concludes that there is a decided gain in final recall as a result of intervening recalls without a re-presentation of stimuli, and this gain is greater for a five-minute period of recall than for an immediate one. The effect of intervening recall is very much greater when final recall is taken after thirty minutes or one hour than when taken at the end of three weeks. Wyatt (102) tested the immediate memory of thirty-eight children of both sexes, ranging from 10 to 12 years, by means of nonsense syllables and concrete terms, digits, and narrative. The highest correlation was between nonsense syllables and concrete terms; the lowest between narrative and digits. Dockerill and Fannings (26) have formulated a test for reasoning composed of ten familiar proverbs. Each pupil was asked to give the best illustration of each proverb that he could recall. The results show high correlation with examination marks and with teachers' estimates. Hunter (44) draws a distinction between "form" perception and "pattern" perception. It is to the total setting or pattern that animals and children react. Geometrically (to the child), the form is more complex than the total setting, because it is not yet analyzed out. In an experiment on formal discipline, Kline (52) had two groups of nine adults each practice for two periods in cancelling from a printed page given parts of speech. In the final test, the practiced group showed only small gains for nouns, verbs and prepositions, and losses for pronouns and adverbs, whereas the unpracticed group showed distinct gains for all parts of speech. Lyans (57) compares the contentions of various studies in the subject of formal discipline, and finally

states the issue as a question: "What are identical elements and what principles control the transfer of learning in them?" The conclusion is that "all learning from experience, all thinking, all inference, is transfer; there are only differences in degree." Chapman's (17) problem is whether there is any such thing in mental achievement as general improvability. The author finds small but constant correlation between initial abilities, and a very slight inter-correlation between improvements.

The problem of the psychology of learning has received a great deal of attention in the last few years, and for a *Literaturberich* of other references the reader is referred to Baird's *Memory, Imagination, Learning and the Higher Mental Processes* (PSYCHOL. BULL., 1914, 11, 305-324; 1915, 12, 333-354.) By no means least among these contributions is that of Professor Baird's excellent translation of Meumann's (62) *Oekonomie und Technik des Lernens*. The book approaches a discussion of learning processes through an analysis of the function of memory, and the subsequent chapters discuss respectively, the relation between perception and memory, including experimental investigations with particular reference to children; associative learning, including memory types; conditions and technique of mechanical learning; stages of learning; retention and forgetting; the education of memory in the schools, etc. Hahn and Thorndike (39) tried measuring the effect of practice in arithmetic under school conditions, and concluded that properly administered speed drills will improve accuracy as well as speed; that the evidence is in favor of longer periods of practice; and that equal practice on groups of different initial abilities within the same grade increases rather than reduces the initial differences.

To ascertain what mental differences exist between groups of bright and dull pupils, Pyle (70) gave group tests in logical memory, rote memory, word building, association, and completion to the children of six different Missouri city schools. Good pupils are a trifle more than a year younger than poor pupils within the group. In a normal school class Scott (80) had each member estimate the relative "brightness" of the other members of the class and found a high correlation between the judgments of the different members of the class. The tests tried in comparison with these different estimates were rote memory, progress in reading upside down, tone discrimination, acquisition of ideas in reading from the printed page, retention of ideas for a week, range of information, two

completion tests, and quickness in crossing out *as* and *ts*. Results of the tests show that one could prophesy with a high degree of approximation when these pupils entered the school (if the tests were applied then) just what pupils and teachers would think of them as far as "brightness" was concerned, six months afterward. Meriam (60) determines the aims and methods of education by the pupils' immediate needs rather than preparation for high school. The seven years' course consists of four "studies": Observation of nature and industrial activities; playing games of present interest; handwork—making things of immediate usefulness; enjoyment of stories, pictures, music. Reading, writing, arithmetic and the so-called common-school branches are not taught as such at all. Finklestein (33) gives a detailed and very suggestive study of the marking system with 29 distribution charts of the grading in various courses at Cornell University; Rugg (75) and Kelly (49) contribute studies of standards of marking in elementary schools, high schools and colleges, and of marking examination papers, also an analysis of standard texts as aids in standardization. Deuchler (24) gives an historical and critical discussion on methods of computing correlations between pedagogical and psychological material including that of Spearman and contemporary Germans. In America a number of small psycho-educational laboratories and clinics have recently been organized in connection with universities, colleges, normal schools and city school systems. In Germany last year Rupp (76) began a series of articles outlining in detail methods and apparatus for work in experimental education. The first article deals with color perception, including after images, contrast, brightness, intensity, saturation and similar phenomena; the second article describes experiments in visual space perception and the anatomy and physiology of the eye; and the third article analyzes visual illusions with experiments supplementary to those commonly used in psychological laboratories.

Rosanoff and Rosanoff (73) are endeavoring to determine, "At what age in childhood or in youth do the associational tendencies as they are observed in normal adults become fully developed?" The conclusions indicate that children of eleven approach mature associational tendencies but before that age give a large number of doubtful and individual reactions and failures of reaction. Roemer (72) gives a comparison of abnormal with normal children in a free association test. He found that "The associations of abnormal children differ from those of normal children, particularly in the

use of adverbs and pronouns. They have fewer preferred associations than normal children, and these are frequently of different type."

To determine whether reaction time was largely conditioned by ability to articulate, Hollingworth (43) tried tests on 19 people, in which after each individual had gone through tests 100 times, he was given a sheet on which was typewritten in the case of the color naming test, the names of the colors and the opposites that the subject customarily gave. He was allowed to read these five times as quickly as possible, and the reading and articulation time were recorded. Then the test records were consulted and an initial and final average made from the first five and the last five of the 100 trials. It is apparent, since association times do not at all approach the limits set by articulation reading time, that a considerable time is required for something else. The correlation between reading and articulation time is .70. Kuhn (54) has studied in an elaborate manner the effect of recitation and reading on *Einprägung*. Benson (11) attempts by rather fantastic psychological and pedagogical tests to determine sense training, judgments, and knowledge as applied to everyday life. Demeny (23) gives a discussion of the physiology and psychology of effort, which reveals little knowledge of modern psychology, but is sound and wholesome in its emphasis upon controlled effort. Winch (99) has formulated a set of problems in mental reasoning such as would enable the child to adapt himself to social conditions. Ziehen (105) has published a very comprehensive little treatise of 23 chapters, the chief of which discuss the original idea of angles and their development. Koch (53) has made a careful, painstaking investigation into the feeling qualities which is of pedagogical import.

General Studies in Educational Psychology.—Eliot (29) finds that we have already accomplished a great enlargement of education by means of special schools but we need a changed curriculum and newer methods of teaching. We need for democracy, instruction in economics; for industry, vocational instruction; and for the pleasures of life, the larger training of the senses. Russell (77) compares the average age of graduation in secondary schools in the United States and Germany, and analyzes the elements of the German methods of instruction that make for economy of time and which we might use advantageously, such as the six-six plan, triple division of the recitation, correlation of the subject matter, and specific training. Baker (5) by means of a questionnaire elicited

the general concensus of opinion that the school courses are too long; that economy in the selection of subjects, topics and in methods will save approximately two years in the whole period of general education. With greater efficiency in the earlier periods, the college course may well end nominally at 20 instead of 22. At University of Chicago this problem is being worked out experimentally. In this line of effort Kennedy (50) has issued a detailed account of his Batavia system of individual instruction and Burris (14) has summarized Wirt's Gary system, which rests upon a careful consideration of the needs, motives, capacities and interests of pupils.

Ogden (67) finds one important point of contact between psychology and education through the principles of the new thought psychology in reference to learning. Huther (45) treats the problem of pedagogical psychology with particular stress on the inductive and deductive methods and Meumann's experimental data. Adler and Furtmüller (1) have printed a large collection of the essays and papers given at Brussels at the international congress on *Pédologie*. Among the topics included are: the doctor as an educator; educational errors; obedience and obstinacy; education of parents; strictness in education; psychology as a practical calling; and the choice of a profession. In a general discussion of an *a priori* nature, Schroeder (78) claims more time should be devoted to the psychology of conduct or behavior in order to make a psychological study of the springs or sources of conduct, which he claims Bagley has failed to do in his discussion of "attitudes." In his applied psychology Münsterberg (64) takes as his thesis that "He (the educator) must supply information, must train pupils in certain abilities and must awake in them certain interests." Yocom (104) formulates the problem of education by analyzing current generalizations into a multitude of specific problems bearing on experimentation, with particular reference to general culture, discipline, and democracy in relation to the course of study.

In analyzing the purpose of education from the standpoint of contributions from experimental psychology, Pitt (68) stresses the psycho-physical complexes of memory, mood, motive and character, with particular reference to the contributions from the Society for Psychical Research. Baldwin (6) analyzed Locke's aim of education and denies that he is a good example of the disciplinary school, where he is usually classified.

Thorndike (90) has made a keen critical analysis of the applica-

tion of psychology to education, supplemented by a constructive program of work. Wilbois (97) has emphasized voluntary and emotional development in his discussion, Cellerier (16) has given an outline of the education of the will, Enriques (32) has made a study of the relation of memory to education. Baratono's (10) discourse on education Ioteyko (46) on the aim and tendencies of education, and Marchesini's (59) treatise have not been available for review. An important contribution from the methodological standpoint in education is that of Hartmann (40). Baldwin (8) reviews fifty-four papers on experimental educational psychology.

Measuring Scales.—A well-defined movement has arisen in this country during the past two years for measuring experimentally the standards of efficiency in the teaching of various school subjects, norms for school room situations, and the abilities of pupils from a psycho-educational point of view. These scales, as a rule, have been worked out inductively with approximate norms and arranged in an ascending series of units for comparison with individual or group efforts. The present need is for a more careful application in schools rather than propaganda, since many older reactionists in education are widely condemning on *a priori* grounds efforts toward any standardization.

That measuring scales are beginning to take a direct hold on the public schools is being demonstrated by the coöperative research plan organized between the Department of Education at Harvard and the city of Newton outlined by Learned (56). The first Harvard-Newton bulletin by Ballou (9) includes the preparation of scales for measuring description, exposition, argumentation and narration. The Hillegas (41) scale for measuring English composition, obtained by a study of a large number of compositions, which have been graduated on the basis of the combined judgment of one hundred persons to whom were sent compositions selected from those of 7,000 children. In order to secure compositions of the lowest merit, it seemed necessary to insert eight artificial samples. As soon as the scales are refined to include narration, description, argumentation, exposition, and perhaps other types of English work, the measuring capacity of teachers of composition may be tested out. Elliott (31) maintains "that a group of a dozen competent superintendents, of relatively small school systems, working together on this problem could do more in a single year in the production of a workable method for the determination of the merit of teachers than could a hundred superintendents and non-superintendents working alone for a generation."

In reading, Starch (81) bases his evaluation of the measuring scale on the chief elements of (1) speed, (2) comprehension, and (3) correctness of pronunciation (which has not been worked out), while the measuring scale itself consists of graded selections made from various readers. His standard values are not based on the arithmetical but on the smoothed values of the scores of 3,511 children of seven cities, rated for speed and comprehension. More data and much more adjustment will be required before the scale approaches accuracy. Brown (12) in a plan for the measurement of pupils' efficiency in silent reading takes account of rate, quantity and quality. The results of these three measurements are reduced to standard units of reading efficiency by multiplying the number representing the rate by the average reproduction. Judd (48) discusses the need for standard tests in reading and submits a selection to serve as test material for ability to get the meaning of the passage by silent reading. (For additional references see Cameron, *PSYCHOL. BULL.*, 1914, 11, 329-330.)

Davies (20) attempts to measure arithmetical ability on a comprehensive scale. He states as his purpose an effort to discover a simple way of testing general efficiency in arithmetic or special ability in any particular department of work. His results show a wide diversity in individual capacity, but a close approximation to arithmetical efficiency as measured by the term grade. Baldwin's (7) investigation of the application of the Courtis tests to 200 college students showed that these students ranked tenth grade or above, and a positive coefficient of correlation was found between the various processes with a range of distribution from .24 to .56. Lane (55) tried the Courtis tests (19) on a whole school system, and found that the efficiency of a whole school might be raised in a short time. At the same time he points out that 16 per cent. individually lost in speed and 6 per cent. in accuracy while 9 per cent. made no change in speed and 5 per cent. no change in accuracy. Monroe (63) attempted to establish a scale in fundamental algebraic ability. The author found a wide distribution of accomplishment indicating the need for more than one type of training, and decided sex differences in that boys showed more accuracy than girls. Cajori (15) doubts the practicability of measurements in secondary mathematics, but advocates a preliminary "array" of pupils according to memory tests, original exercises and diligence in class work, and on the basis of this data an assignment of each pupil to a place on an abstract scale constructed according to the normal frequency curve.

A five-group system based on the amount of deviation from the mode would seem to be the most convenient method for recording standing.

Material for Starch's (82) spelling scale is composed the first word of every odd page of the dictionary. After all technical words were eliminated, they were placed in groups of one hundred words each, putting the words in order of length. The same test of 100 words is used for all grades, thus eliminating the chance of the words being too easy for brighter pupils in a grade, and making it possible to measure grade to grade progress, which, he believes, cannot be done satisfactorily with the Ayres or Buckingham scales. Buckingham (13) aims to derive a scale for the measurement of spelling ability, and to show some of its uses and applications. Words are arranged on a linear projection in such a way that the words from the lower to the upper end of the measuring scale are located at intervals determined by the difficulty of each word. Such a scale will, he thinks, enable us to measure the spelling ability of any individual and to determine in relation to known values the difficulty of any word in the language. The scale was obtained inductively from words found difficult for 8,791 grade children in New York City. Ayres (3) has formulated a spelling scale based on the vocabularies of a large number of personal and business letters.

Ayres's (4) scale for determining the quality of the handwriting of adults is similar to the scale for measuring the handwriting of children issued in 1912 which has been so widely used. Starch (83) discusses the reliability of the Ayres and Thorndike scales for the measurement of handwriting as tried on 4,074 pupils in 19 schools in eight cities located in Wisconsin, New York, and West Virginia, and concludes that both scales show a high degree of relativity and are far more accurate than the old percentile basis of marking. The Thorndike scale he finds preferable for grading a large variety of children because it extends further at the upper and lower limits.

Gray (36) advocates the training of judgment as a necessity in evaluating scales. He gives as an example the use of the Ayres scale, where it was found that the evaluation was dependent upon the general impression of the teacher, but according to his method the general impression was checked by a set of details, including letter formation, execution, mixed slant, indistinctness, carelessness, size and legibility. Freeman (34), after making an analysis of the handwriting movements of adults and children, found that writing is characterized by a decided rhythm which is more pronounced in

the developed than the undeveloped movement. The writing of children is less rhythmical, less organized, and less automatized. The monograph consists of an historical sketch, description of the apparatus, and discussion of the results. Subsequently, after a criticism of the Ayres and Thorndike scales on their lack of uniformity, Freeman (35) presents an analytical scale.

Rugg (74) has derived a scale for measuring free-hand lettering by an evaluation of 1,500 papers of engineering students, graded on a per cent. basis, and covering the component elements of block lettering, height of letters, spaces, stems and ovals. The results of six instructors and 300 students show an equal distribution above and below .75 and the students show a gain in accuracy over past years when the scale was not in use. Thorndike (89) has also published an explanation of the methods of obtaining a drawing scale and its use. It is still in the formative period and for the present is based on general rather than individual merit.

The bulletin of the recent Indiana Conference (69) on educational measurements includes "Giving of Tests in Reading," "Individual Differences and their Causes," "Units and Scales for Measuring Educational Products," all by Professor Thorndike; "Organization of School Surveys," by Supt. H. L. Smith; "Use of Courtis Tests," by Mary Kerr; and "Elementary Teachers and Coöperative Research," by M. E. Haggerty.

Dawson (21) has attempted to measure the results of the use of common botanical objects for identification by 97 graduates of high schools. His conclusion, which is a blanket statement with little psychological insight, is that they fail to recognize things in their environment, that lack of knowledge was due to lack of interest, and that they therefore failed in concise thinking and accuracy of expression. Beginning with data based on tests of scorings in spelling and writing, composition, vocabulary, arithmetic and other data, Elliott (30) discusses the standards of achievement for the 5th and 7th grades, attainment in class measurement of class size and in an appendix gives directions for administering these tests, samples of others, a preliminary list of composition subjects, notes and a bibliography.

Courtis (18) in a discussion of educational diagnosis takes as his thesis that the schools already provide ample opportunities for those able to learn, and that the efficiency of school work can most easily be increased, not by increasing the opportunities provided, but by making for each child an individual adjustment of work

based upon its measured needs. He prophesies that by "systematic educational diagnosis of the causes which prevent the success of individuals, and by the application of proper remedies, it will be possible for an ordinary teacher to have 75 per cent. of her children growing, in place of the conventional 30 per cent."

Rice (71) maintains that a new basis of supervision is needed, based not on what the teacher knows or what methods she employs, but by what she accomplishes. The basis of this accomplishment is to be determined by the class standing derived from efficiency tests. Decroly (22) has devised a scale, free from the charges brought against the Binet scale of laying too great stress on the use of words, by means of sets of pictures representing a story. The task of the child is to arrange them in a logical order and the results obtained lead the author to think the experiment a promising one. Trabue (91) has formulated a general intelligence scale based on Ebbinghaus's completion sentence method. The Yerkes, Bridges and Hardwick scale (103), an adaptation and elaboration of the Binet-Simon scale, formulated on a suggestion made by the late Dr. Huey, is the most promising measuring scale for general intelligence so far available. The scales consist of twenty groups of tests for application to each individual including motor co-ordination; visual perception; visual and kinæsthetic discrimination; association; suggestibility; auditory, visual and other types of memory; imagination; æsthetic, practical and logical judgment; analysis, comparison and ideation. For each test within each group there is a quality estimate of performance in opposition to the "all-or-none" principle, which is indicated by a credit of one, two, three or four points. For example, four gradations are recognized in the free association tests and two in definition of concrete terms. After trying out the tests on a limited number of normal, delinquent, blind and deaf mute children the reviewer has found the series to have a great many advantages over the Binet, such as the allowance for individual differences in mental traits, and differences for social, racial, industrial, sex and pedagogical classes. Another strong feature of the scale is its applicability to the earlier adolescent ages, since the norm for fifteen years of age is probably not over 85 per cent. of the possible number of points. Some of the limitations of the scale are: the evaluation and assigned points are arbitrary and will require considerably more trying out before norms can be established; like the Binet scale the affective phases of mentality are about neglected; some of the analogies and sentences

need further revision. Chapter XII projects in outline form a universal point scale for all ages, including the affective side of mental life.

Witmer (100) in formulating a series of scales for measuring the relation of intelligence to efficiency differentiates two kinds of human performances usually connoted by the term efficiency and proposes the use of the words *competency* and *efficiency*. Competency and intelligence are teleological concepts and efficiency is a mechanical concept. For diagnostic purposes a distinction is also made between grades and levels of intelligence. Twelve scales are outlined for a differential diagnosis of intelligence for the grading and leveling of individuals or groups based on *grades* of intelligence and efficiency, and *levels* of growth, sex, culture and normality. The growth levels rest on the phylogenetic and ontogenetic distinction. The sex and culture differences are suggestive but not new; in the normality level, the deficiency scale is based on Witmer's theory regarding children with "mental defects" as contrasted with "mental defectives" and a classification of these children is promised.

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SPECIAL REVIEW

Vorlesungen zur Einführung in die experimentelle Pädagogik und ihre psychologischen Grundlagen. E. MEUMANN. 2te Aufl. III Bd. Leipzig: Engelmann, 1914. Pp. xvi + 919.

With this ponderous tome the author brings the revision of his encyclopedic work on experimental pedagogy to a conclusion. It is monumental in its size, in its scope, in its penetrating analysis, and in the fact that it comes as the crowning effort of a life of untiring industry and enthusiastic investigation,—for barely four months after the last word was written a sudden illness stilled the active brain forever.

Almost every page of the book reveals the catholicity of the author's reading, and it is easy to understand why in the last paragraph he proclaims the international character of pedagogical investigations and laments the unhappy world war which threatens to destroy the best in European civilization and to overthrow the great structure that education has painstakingly built up.

The first chapter of the book, which is the fourteenth lecture of the entire series, deals in one hundred and fifty-five pages with the mental work of the school child and its relation to the methods of the teacher. There is a discussion of the psycho-physics of work, a psychological analysis of work, with especial reference to the Kraepelin methods of investigation, and a section on the economy and technique of mental work. The author finds himself in entire agreement with Thorndike's searching criticism of Kraepelin's explanation of the work curve, and believes that the conditions are so complex that much more experimental work is needed before valid judgments can be passed on the factors involved.

In the last section of the chapter Meumann reaffirms his belief in general training, recounts his early experiments (which Dearborn has shown were without adequate controls) to prove the transfer of training in memorizing, summarizes the work of others, notably Winch, whose results are favorable to this view (the recent careful work of Sleight is entirely ignored), and lays great stress on the value of formal training as an educational procedure. It must be confessed that the arguments offered in support of this position impress the reviewer as particularly weak. General or

formal training, resulting from practice in any type of act, is said to be due to the accompanying training (*Mitübung*) of general mental functions (as attention, will, emotional attitude, etc.) involved in the performance of the act in question, and is supposed to increase in amount as the learner's interest in the immediate outcome of the particular practice decreases. This presupposes the existence of general mental functions in an extremely abstract but marvellously efficacious form, and, as Wundt has pointed out, approaches perilously near the generally discredited assumptions of the old faculty psychology. The real question at issue here, viz., to what extent is practice in a specific activity accompanied by improvement in more or less closely related specific activities, is merely obscured by an appeal to such general mental functions.

One hundred and thirty pages are devoted to a summary of theories and experiments on mental fatigue, a field in which much work has been done, but little has been ascertained that is of either theoretical or practical significance for education. In the discussion of home versus school study the author points out that the results of experiments show the decided superiority of the latter in both quantity and quality of accomplishment, but claims that home study is really superior if it is conducted under the proper guidance of teachers, and if originality of thinking rather than formal memoriter work is demanded.

The sixteenth lecture deals chiefly with the psychological basis of observational instruction (*Anschauungsunterricht*), and contains a survey of the literature on the psychology of report and a discussion of its application to pedagogic procedure. Stern's categories of observation are criticized and amplified, particularly in the direction of the child's spontaneity, and there is an extended consideration of the order in which these phases of observation manifest themselves. As an example of the extreme insistence upon sense training the Montessori method is described in detail, and its weaknesses, its contradictions, and its extravagances subjected to an unsparing criticism.

The remaining five lectures present elaborate summaries and critical analyses of experimental work in reading, writing, spelling, the psychology and pedagogy of number, drawing, modelling, the appreciation of pictures and sculpture, and the extension of experimental investigations to secondary school subjects. Each field is treated with the same inclusiveness of detail, the same fertility of analysis, the same keen appreciation of the need of further research.

While the style is perhaps a trifle prolix, and the author's interest in the analysis of his problems causes him to raise more questions than he can answer, it will be of distinct value to the science of education to have its attainments thus catalogued, the path of its further progress pointed out, and the possibilities of the experimental method of attack clearly demonstrated.

J. CARLETON BELL

UNIVERSITY OF TEXAS

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PRINCE, M. *The Psychology of the Kaiser*. Boston: Badger, 1915. Pp. 112. 60 cents.

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ADLER, F. *The World Crisis and Its Meaning.* New York: Appleton, 1915. Pp. 233. \$1.50.

NOTES AND NEWS

THE EDITORS take pleasure in announcing the election of Professor Madison Bentley of the University of Illinois to the Editorial Board of the PSYCHOLOGICAL REVIEW PUBLICATIONS. Professor Bentley will become responsible editor for the PSYCHOLOGICAL INDEX.

THE present number of the BULLETIN, dealing with Child and Educational Psychology, has been prepared under the editorial direction of Professor Bird T. Baldwin, of Swarthmore College.

THE following appointments have been made at the Carnegie Institute of Technology: J. B. Miner, of the University of Minnesota, assistant professor of psychology, L. L. Thurston, of the University of Chicago, and Margaret L. Free, of Bryn Mawr College, assistants in psychology.

AMONG psychologists who gave courses in summer schools as visiting instructors this year were Professors Bell at the University of Tennessee, Odgen and Morse at the Peabody College for Teachers, Cameron at Harvard University, Hall at the University of Pittsburgh, Buchner at the University of Kansas, and B. T. Baldwin at Johns Hopkins University.

THE department of psychology of Reed College, Portland, Oregon, plans extensive improvements in its laboratory.

AT Vineland, N. J., a new laboratory of thirty rooms is now occupied by the department of psychological research. While giving courses in the summer school at Berkeley, Dr. Goddard gave a special course of lectures to the Police Department on the psychology of crime.

DR. CHRISTIAN A. RUCKMICH, associate in psychology at the University of Illinois, gave a course of four lectures on the psychology of music at the Harvard summer session.

DR. HENRY J. WATT, lecturer in psychology at the University of Glasgow, who has been interned in Germany since the beginning of the war, has been allowed to return home.

The following items have been taken from the press:

DR. E. LASK, associate professor of philosophy in the University of Heidelberg, and Dr. W. Conrad, docent for philosophy in the University of Halle, have been killed in the war.

DR. ANSCHUTZ, docent in the Hamburg Scientific Institute, has accepted a call to the professorship of psychology in the University at Constantinople.

PROFESSOR M. ROTHMANN, of Berlin, died on August 12, 1915. His publications dealt mainly with the functions of the central nervous system, and recently he inaugurated at Teneriffe a station for the study of the anthropoid apes.

A COMMISSION for the investigation of the causes and prevention of mental deficiency has been appointed by the Governor of Indiana.

DR. G. C. BASSET, has been promoted to the professorship of educational psychology and directorship of the psychological clinic in the University of Pittsburgh.

E. HERING, professor of physiology at the University of Leipzig, best known to physiologists for his work on color vision, will retire at the close of the winter semester.

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THE
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GENERAL REVIEWS AND SUMMARIES

DYNAMIC PSYCHOLOGY

BY F. L. WELLS

McLean Hospital, Waverley, Mass.

Crile (2) has collected a number of addresses and papers on the interrelations of emotion, shock, and the expenditure of physiological energy, which form an important wing in the structure of a mechanistic psychology. As he formulates his results, fear, like trauma, may cause physiological exhaustion and morphological changes in the brain cells. The cause of the exhaustion of the brain in ordinary post-operative shock is the discharge of nervous energy in the futile effort to energize the paralyzed muscles in the attempt to escape from the injury just as if no anæsthetic had been given. The principle of *anoci-association* thus removes from surgery much of the immediate risk of its trauma; it places certain of the phenomena of fear on a physical basis; it explains to us the physical basis for the impairment of the entire individual under worry or misfortune. Constructively, fear is an injury which when recognized is instinctively avoided. In a similar manner anger may be softened or banished by an appeal to the stronger self-preserving instinct aroused by the fear of physical damage, such as the physical injury of brain-cells.

"The dissemination of the knowledge of the far-reaching deleterious effects of protracted emotional strain, of overwork, and of worry will automatically raise man's threshold to the damaging activating stimuli causing strong emotions, and will cause him to avoid dangerous strains of every kind. The individual thus protected will therefore rise to a plane of poise and efficiency far above

that of his uncontrolled fellows, and by so much will his efficiency, health, and happiness be augmented.

"A full acceptance of this theory cannot fail to produce in those in whose charge rests the welfare of the young, an overwhelming desire to surround children with those environmental stimuli only which will tend to their highest ultimate welfare."

Stimulation of the defensive motor mechanism leading to a physical struggle is action, and the stimulation of this mechanism without action is emotion. Harm is done by the chemical products of emotional reaction unless they are consumed by motor activity; hence the value of laughter, crying, etc., where no more concrete discharge of the emotion is possible. A special chapter presents in a general way the formulation of a physiological system evolved primarily for the transformation of latent energy into heat, the "Kinetic System" (brain, thyroid, adrenals, liver and muscles); in this conception we find a possible explanation of many diseases, one which points the way to new and more effective therapeutic measures than those now at our command. A final chapter deals with the acidity of the blood, as related to anaesthesia and the subsistence of life.

Ribot (3) contributes four essays, only the first two of which are represented in the title of the volume. The motor elements are the more stable factors in the mental process; they are the skeleton upon which the entire process is built. Unconscious mental activity depends upon the prominence of motor residuals. "One may conclude that in the unconscious, thoughts are not represented in a stable manner except by tendencies, *i. e.*, movements." There is a long discussion, involving some pathological data, of imageless thought, which results negatively, though the adherents of the idea might not accept his definition of terms. In the final chapter he takes up the principle of the economy of effort in its influence on various factors of life for good and ill, from phonetic changes to the psychogenesis of religions.

Cannon (1) has collated in book form an account of many researches by himself and his assistants, which bear on the physiological effects of major emotions. A briefer account of them, written from a more especially psychological standpoint, was taken up in this review last year. There is a short summary of the findings in regard to the effect of emotion on digestion, and a systematic account of the autonomic nervous system with its cranial, sympathetic and sacral divisions, and their relations. Six chapters deal with the

adrenin findings, the methods of demonstrating it, its secretion in strong emotion and in pain, its improvement of the contraction of fatigued muscle (raised arterial pressure and lowered threshold of response) as well as the lowering by adrenin of the coagulation time of the blood. Adrenin also causes the liver to set free sugar, whose presence in the blood further increases muscular efficiency. The effects of altered arterial pressure receive separate consideration. An analogy is found between these effects of emotional excitement and those of asphyxia. The different theories of hunger are discussed and the conclusion reached that the sensation is induced by periodic contractures of the stomach. The important conclusion may be restated that since the peripheral effects of different emotions seem very similar, their essential characteristics are probably cerebral.

The last chapter takes up the means of preserving the good features of the fighting emotions without recourse to the destructive process of war, emphasis being laid on the value of international athletic competitions in this regard. As Cannon points out, the conditions of warfare no longer furnish so suitable an outlet for the fighting emotions as formerly, since with the practical abolition of direct contact between enemies, the advantages gained from the dynamogenic products of emotion disappear. It should be remarked that conversely, hatred is no longer a proper concomitant of efficient warfare, since victory is not to the side which can exert the strongest physical force with its own bodies, but which can most intelligently direct greater forces of nature. Hatred and other strong emotions disturb this direction. The chopper who became angry at the tree he was felling might make stronger strokes with his axe, but they would be misdirected, and he would do neither so quick nor so clean a job as he who worked with "cold-blooded precision." The prizefighter knows that a sure way to victory over his antagonist is to "get his goat," *i.e.*, to make him lose his temper, when, though his blows may possibly be stronger, they will be ill-planned, easily avoided, and his defense will break down entirely. Blücher was scarcely made a better strategist by his reported mannerism of thrusting his sword through an imaginary Napoleon. That state could therefore expect the most efficient conduct of modern war from those of the best education in its methods, rather than from those dependent upon occasional fervors aroused by invasion or a traduction of national honor. Further light on these topics of Cannon's last chapter is thrown by the very

dispassionate "War Book of the German General Staff" (4), recently translated. The object of warfare is the complete destruction of the enemy's material and mental (*geistig*) resources; the suffering inflicted should be mitigated, however, in so far as this is compatible with the primary purpose.

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VOLUNTARY PHENOMENA

BY R. S. WOODWORTH

Columbia University

Hammer's experiment (3) is of considerable interest. His subject, watching the movement of an artificial star carried by a pendulum, was to react with the finger synchronously with the passage of the star behind a vertical hair (the "transit" observation). Sometimes, however, the star was extinguished shortly before transit, and the subject was then to omit his reaction. When the star was extinguished as much as 300σ before transit, the reaction could always be inhibited; less than 200σ , never. Between these limits, more or less frequently. Feelings of tension were observed as the star approached the line, and feelings of release as it moved away, in the preliminary swings that were allowed before the swing during which the reaction was required. The hand seemed to be rehearsing its reaction in these preliminary swings. It was clear that the reaction began, internally, some time before the actual movement, developing gradually and agreeably, and at first outside the field of attention; unless the subject's "disposition" was unfavorable, when a disagreeable moment of sudden decision occurred, with a delayed reaction. If, now, the star was extinguished very early in its swing, before the impulse to reaction had begun to develop, there was no counter inhibitory impulse, but

simply a "standing pat." When the disappearance of the star came later, there were conflicting impulses toward reaction and inhibition; and the later it came, the stronger was the reaction-impulse, and the more difficult of inhibition. If the disappearance came too late, the inhibitory impulse failed altogether to develop, the subject accepting the situation without struggle or unpleasant feeling. When the struggle was close, the feeling was very unpleasant; when the inhibitory impulse had an easy victory, the feeling was one of satisfaction.

As a voluntary act for introspective analysis, with objective registration also of reaction time and of breathing and pulse, Kramers (4) chose the recognition of four-place numbers, previously shown, with reaction by finger movement—the instructions sometimes calling for reaction with recognition and non-reaction with non-recognition, sometimes for the reverse, sometimes for reactions with different fingers to recognized and unrecognized stimuli. The purpose in thus varying the instructions was to facilitate introspective study of the process of reaction. It was found much easier to connect reaction with recognition than with non-recognition, the latter requirement often leading to false reactions. This fact is interpreted in terms of the Wundtian feelings; in recognition the feeling is one of release, in non-recognition one of tension; and the reaction-feeling, being itself one of release, fuses more readily with the recognition feeling than with that of non-recognition into a total-feeling from which the voluntary act can develop. There are other similar observations, similarly interpreted; but the author himself prefers not to insist on his results, believing that his contribution consists mostly in opening up the problem and suggesting methods. He suggests that retrospection may be either immediate ("reap-perceptive") or delayed ("reproductive"), the former being suited to bringing out what is peculiar to a single experience, and the latter, carried out after a long series of similar experiences, being suited to the discovery of what is common to all of them. This reproductive retrospection is apparently identical with the old "reflexion," which psychologists have been trying to banish from the science. The author gives no clear-cut instances of results gained by this method.

Bauch (1) follows up the work of Marbe and others on "uniformity of reactions," the best-known expression of which is found in the "frequency tables" for free association, by allowing his subject a choice of several arm movements, with instructions, however,

to execute the movement as rapidly as possible. On a horizontal table, seven points were placed at distances of 160 mm., forming a regular hexagon with its center, and, the finger being placed on any one of the points, was moved at a signal to any other point, while the reaction time in starting and the duration of the movement were recorded by Marbe's smoke method. From each starting point, some one terminal point was more frequently, and usually much more frequently, chosen than any other. The frequent movement was more rapid than the less frequent, was more often flexion than extension, and, as shown by supplementary observations, was apt to be judged the easiest or most convenient movement from the given starting point. The result, then, comes apparently to this, that the easiest and quickest movements are commonly selected when rapidity of movement is desired, and that they are either known from past experience or quickly discovered in the course of a series of trials.

Bleuler (2) attempts to show how the concept of "*Schalten*," or switching in the nerve centers, affords a basis for accepting psychic causality and the reality of will. The path and outcome of a reaction are not determined wholly by the stimulus, but partly by central influences which shunt it in or out, hither or thither, and thus inhibit, release or direct it. The whole personality is concerned in these switching operations, and the act of will consists in the influence thus brought to bear by the personality on the outcome of any single reaction. Voluntary action differs only in degree from emotional and reflex action, which also are subject to switching; and, in fact, there is no difference in principle between physical and psychical causation.

Among other interesting observations by Sano (5) on the behavior of the inhabitants of Antwerp during the bombardment, is the following which bears on the study of will: without much sign of fear, introspective or objective, there was so great an absorption in the condition of affairs that serious work on any other subject was impossible, while there was an overflow of energy into such channels as talking and letter-writing. Those who fled to Holland showed extraordinary resistance to fatigue, a fact which leads the author to conjecture that, in spite of the absence of violent emotion, the adrenals may have been stimulated as in fear or rage.

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LOCOMOTOR FUNCTIONS

BY H. C. STEVENS

University of Chicago

The articles summarized in this review fall rather definitely under three headings: the energy relations of functioning muscles, physiological experiments on the locomotor reflexes and pathological observations on disturbed locomotion. Benedikt (1), in addition to describing a case of paralysis of the muscles supplied by the peroneus and the tibialis nerves, applies Watt's formula to the performance of any muscle. According to this formula, the efficiency of a muscle is represented by mht , the product of the muscle force, m , into the distance, h , through which the muscle acts, and t , the duration of the action. The energy transformations of man upon a horizontal path are calculated by Brezina and Reichel (2), from experimental data determined by Brezina and Kalmer in 1911. The problem of the relation of the size of the animal body to the velocity of locomotion is attacked by DuBois Reymond (4) on the basis of experimental observations made by O. Fischer. DuBois Reymond questions the conclusions of Fischer that the law of corresponding velocities applies to human beings as well as to inanimate self-propelling objects such as ships. The law is stated as follows: if the resistance of the water to a ship of the size, l , with a velocity, v , is equal to r , then the resistance of a ship of the size, nl , with a velocity $v\sqrt{n}$ is equal to n^3r^3 , i. e., is proportional to the cubic contents. It has been supposed that the same law holds for human locomotion. Therefore with equal muscular effort, the velocity of larger and smaller men would be proportional to the square root of the length of the body, i. e.,

$$\frac{v_1}{v_2} = \frac{\sqrt{l_1}}{\sqrt{l_2}}.$$

O. Fischer made observations on 103 soldiers and 8 students. These subjects walked at "*Wanderschritt*" a distance of 2 kilometers. The length of body, length of step, length of leg, number of steps and velocity were determined. Using this data, DuBois Reymond attempts to determine the applicability of the law of corresponding velocities to human locomotion. He divides the 111 subjects of Fischer into nine groups according to the length of the body. With these figures he correlates the velocity of travel. Reducing the results to percentages, he finds that the small individuals have a somewhat greater speed of movement than the larger individuals. The average height of the two larger groups was 172.1 cm., that of the two smaller groups 160 cm. The ratio of the roots of these numbers is 1,000 : 962, while the ratio of the velocities of the two groups is 1,003 : 1,002. DuBois Reymond concludes that the law does not hold for human locomotion. The absolute force of a muscle is measured by the greatest weight which a muscle can just raise. Reys (9) has attempted to calculate that quantity for the human triceps suræ. First estimating the volume of the muscle, he obtains the value of 566 kilograms as the absolute force of this muscle in a strong, healthy, man. The same unit for each square centimeter of cross section of the calf muscle is 5.2 kg. The effect of high altitudes on muscular work was studied by Vallot and Bayeux (10) by recording the number of revolutions of a squirrel cage at a low level and again in the mountains. Three squirrels were used at Chamonix and at Mont Blanc. The average number of turns of the cage at Chamonix was 6,700 per day. At Mont Blanc the average number of turns was 924 and, after two weeks at Chamonix, was 7,435 per day. Regnault (8) distinguishes three forms of locomotion in man, viz., walking, gymnastic exercise and running. Walking is most advantageous in slow locomotion. According to the results of Marey and Demeny, the optimum rate of step is 60 to 65 per minute. This gives a man of 167 cm., making a step of 140 cm., a distance of 5,040 to 5,460 meters per hour. Above that from 65 to 75 steps per minute the work increases very rapidly and is disproportionate to the result. For more rapid locomotion the author distinguishes *la marche en extension* from *la marche en flexion*. Ponzo (7) records a curious illusion of size which depends upon a change in volume of the fingers caused by the pulse. Objects held between the fingers seem to enlarge and contract with the pulsations of the heart. The movement is attributed to the object and not to the fingers. The author describes an experiment in which, with a

card 25 by 15 cm., the apparent movement can be reproduced. The experiment is classified as an objectification of movement which is a result of the law of the excentric projection of sensations. The relation of the production of heat in a muscle to the time of appearance of the contraction has been studied by Herlitzka (6) by means of a suitable recording apparatus and a thermoelectric pile for determining the presence of a change in temperature. He found that there was a considerable difference in time between the contraction latent period and the thermic latent period; the former was always the shorter. The author holds that the liberation of heat is to be considered an effect and not the cause of the contraction. Adrenin exerts a powerful influence upon smooth muscle fiber. Its effect upon striated muscle has been a matter of doubt. Yas Kuno (11) working with sartorius muscle, with a solution of the drug of 1 : 16,666, found that there was no physiological effect. Application of the adrenin to the rami communicantes in the caudal region of the cord produced no change in the tonus of the legs. In the decerebrate animal, Sherrington demonstrated a plastic extensor tone. T. G. Brown (3) observed a condition of plastic flexor tone in monkeys both after decerebration and chemical narcosis. The author suggests that the phenomenon may be due to the action of the nucleus ruber, for the reason that he observed a similar condition after excitation of that center. It has long been known that locomotion which has been lost as a result of disease of the central nervous system may be regained in certain cases by appropriate exercises. Gordon (5) describes, from the point of view of the clinical neurologist, the nature of the exercises which are beneficial in diseases of the nervous system.

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REACTION TIME

BY V. A. C. HENMON

University of Wisconsin

Woodrow (3) proposes to measure attention by efficiency in simple reaction. Unfavorable preparatory intervals and weak intensities of stimuli were used as detractors, the latter for securing different degrees of attention, and the former to serve as detractors with each of these degrees. When the preparatory intervals of 1, 2, 4, 8, 12, 16, 20, 24 seconds were presented in a regular order, there was a gradual increase in the reaction times expressed as a law that the reaction time equals a constant plus the product of the logarithm of the interval and a constant. When the intervals were presented irregularly there was little difference in the reaction times, all being much lengthened. The prolongation of the times is due solely to the fact that attention is not maximally adjusted. This gives the basis for a satisfactory method of detraction. Different degrees of attention were secured by using four widely different intensities of light and the detraction effect of unfavorable preparatory intervals on each intensity was determined. The results are formulated in the law for any preparatory interval of 2 seconds or over: "The absolute increase in reaction time produced by the use of unfavorable intervals as detractors varies inversely as the degree of attention detracted from." Choice reaction times are influenced fully as much by irregularity in the preparatory intervals as are simple reaction times and the same law of detraction holds for both. Experiments on the effects of practice seem to show that contrary to common view the degree of attention does not improve with practice.

Williams (2) studied the correlations between reaction time,

form of movement and the direction of attention with especial emphasis on "antagonistic reactions." In the typical motor reaction as contrasted with the sensory reaction, aside from the shorter reaction time and the direction of attention to the movement to be made, there is a gradual decrease in the pressure of the finger on the key from the preparatory signal to the beginning of the final movement of lifting the finger. Except in cases of lowered attention, unintentional sensory attention or distraction there were no antagonistic movements. In the sensory reactions the pressure on the key remained uniform or increased from the preparatory signal to the final movement which was then antagonistic in form. The average correction for the antagonistic reaction was 30σ . Marked evidence is shown of types of reactions in attention, in reaction time, and in form of movement.

Ziehen (4) in a short paper reports simple auditory reactions of a Lapp and two Samojeds as 137σ , 148σ and 135σ . Cognition reactions to sounds with a lip key gave times of 410σ and 512σ . Little value is placed on the figures, but further study particularly of complex reactions is recommended.

Todd (1) describes a new pendulum chronoscope with a disc tachistoscopic attachment, conveniently and compactly arranged for mechanical or electrical operation in determining simple reaction times to visual, auditory and tactual stimuli and compound reactions to visual stimuli. The chronographic method used apparently gives a very accurate chronometric scale.

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FATIGUE, WORK, AND INHIBITION.

EDWARD K. STRONG, JR.

George Peabody College for Teachers

In a study of the effects of continued work for four hours upon writing poetry, Thorndike (13) finds "that the speed of work increases throughout the work-period and is not benefited by a rest of 24 hours. The average quality of the product produced falls off a very little during work and is slightly benefited by the rest. The reported satisfyingness of the work falls off greatly during work and is greatly benefited by the rest."

Ash (3) finds noticeable fatigue in steady adding for periods of even one hour. The fatigue was measured by "before" and "after" tests in which the subject was required to reverse continually the perspective of an ambiguous figure. This experiment, Ash believes, shows that mental exertion does have a decided effect upon another single specific mental function, affecting, however, not so much amounts of available energy, as the control of that energy. When this interference of control is thus measured it is found that it requires 11.5 minutes for complete recovery from 30 minutes of work and 47 minutes for 150 minutes of work. The relationship between work-period and recovery-time is thus very different from the findings of Mosso. Ash also finds that there is a slowing up in reversal time as one advances from 9 A.M. to noon, an increase in speed after lunch, and subsequent loss in speed as the day advances. Hollingworth (7) finds that processes essentially motor in character, such as tapping and typewriting, are facilitated by continuous work throughout the day; that processes involving coördination are first accelerated and then retarded; and that processes essentially mental in character show fairly uniform loss of efficiency. He feels that the conclusions point not to a general or special fatigue factor but rather to the presence of a complex work mechanism standing over and above the transient factors of interest, incentive, etc. Martin, Withington, and Putnam (9) also speak of a general fatigue, which shows itself in a fairly continuous decline in irritability, as judged by the sensory threshold as the week advances with a return to the original high point after Sunday's interruption of the regular routine.

Pyle (11) finds a less striking superiority of distributed over concentrated work-periods when learning typewriting than in his earlier experiments in substitution.

Weber (14, 15, 16, 17) shows that muscular work brings about an increase in the blood supply to the musculature of the body at the expense of the blood supply in the viscera. Now as fatigue ensues this increase in blood supply disappears and finally there is a reversal of the original situation. He also finds that if after vigorously exercising a group of muscles, another group is put to work after an interval of about eight minutes there will result not the customary increase in blood supply but a reversal of this blood change. If the interval of time, on the other hand, is less than eight minutes there will be the usual increase in blood-supply. Evidently then when work and rest periods are to be alternated the latter should not exceed eight minutes in length. He shows still further that if, instead of alternating working periods with rest periods, in the case where a small group of muscles are being employed, the working periods are alternated with short periods in which another group of muscles are vigorously employed, there will result a decided increase in efficiency, even as much as 40 per cent. The small muscles as they tire tend to bring about a reversal in the blood supply to the muscles (pointed out above). The activity of the new set causes a decided increase in blood flow which benefits the tiring muscles by washing away the fatigue-products.

According to Amar (1) the rhythm and amplitude of the blood pressure increase with the rate and amount of work. Normal work is accompanied by a regular curve, whereas when the conditions of the muscles become abnormal it is shown by an irregular curve. In a later study (2) he goes into many details as to the "cardiogrammes" of fatigue.

Gruber (5) reports that "adrenalin causes a rapid recovery of the normal irritability of muscle after fatigue and thus a betterment in the height of contraction." Whether this is done by neutralizing, transforming, or destroying the fatigue toxin is still unknown. In (6) he reports that "adrenalin is an antagonist to curare and decreases in 5 minutes or less the curare threshold, in some cases to normal."

Krieger (8) attacks the findings of Atwater and Benedict who found the energy of alcohol is not utilized by the body. He finds this is the case at first, but not to be true after periods of 3 days, the maximum interval of time studied by Atwater and Benedict, Krieger, however, adds that although alcohol may furnish energy for muscular work, still because of its proven bad effects on the body, its use should be condemned.

Foucault (4) presents an interesting mathematical formula which he believes covers the laws of work. He also gives some very surprising illustrations of the superiority of distributed over concentrated work.

Patrick (10) holds that the mental activities developed late in the history of the race, which are so important in the life of civilized man, are particularly prone to quick and extreme fatigue. It is not then close attention which of itself produces fatigue, for close attention in golf has no such effect, but it is the holding of ourselves down to hard work and hard thinking and long-sustained tasks which brings about exhaustion. As a corollary to this view, Patrick adds that the child plays because he cannot do anything else, as his higher brain processes are not developed so that he can work.

Stiles (12) has gathered together in his new book a good deal of interesting material on fatigue and general nervous impairment.

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SPECIAL REVIEWS

An Outline of Psychobiology. K. DUNLAP. Baltimore: The Johns Hopkins Press, 1914. Pp. 121.

Professor Dunlap has given us an excellent manual which is sure to find an appreciative public when once the significance of the rather formidable title is understood. "Psychobiology" has hardly as yet won a place in our terminology and it may be doubted whether one person in ten would at all suspect the content of this book from an inspection of the label. Moreover, after one has made inspection, the extreme preponderance of the biology in it over anything conventionally connected with psychology, impels one to question still further the propriety of the title. However, "What's in a name?", the main thing is the material itself and that is certainly good.

The author has brought together in compact form the information concerning the body structures and functions most essential for students of psychology. We have accordingly chapters on the cell, the adult tissues, muscular tissue, nervous tissue, afferent and efferent neurons, gross relations of the nerves, spinal cord, brain and other ganglia; the visceral division of the nervous system, glands, the functional interrelation of receptors, neurons and effectors. The statements are notably clear and concise and the text is profusely illustrated with plates for the most part excellently chosen and finely rendered. In the preface occurs this sentence:

"Of late it has been becoming clear that the pressing need in psycho-physiology is for the study of muscle and gland, and that only through the study of these tissues in their structural and functional relations to nervous tissue can neurology be made psychologically valuable."

To the form of this statement many psychologists would probably demur, although with its general intent we should perhaps all agree. It is, however, a striking testimony to the actual situation that despite Professor Dunlap's conviction, he gives only somewhat over one sixth of his space to glands and muscles. With the rapid accumulation of knowledge now in progress presumably later editions of his book may see this ratio substantially altered. Meantime, whether or not one be wholly sympathetic with the view which magnifies glands and muscles quite so markedly, it is past all ques-

tion a sign of wholesome progress that the entire physiological organism should be recognized as significant for the appreciation of mental experience and not merely the nervous system taken in isolation.

The reviewer has been somewhat puzzled, in view both of Professor Dunlap's expressed opinion and of many distinctive aspects of contemporary psychology, that the author has seen fit to subordinate so completely all discussion of the sexual apparatus. There is only the most incidental reference to the matter.

The printers have done their work well and we predict a wide welcome for the text, which is dedicated to Professor George M. Stratton.

JAMES R. ANGELL

UNIVERSITY OF CHICAGO

The Man of Genius. H. TÜRK. (Trans. by G. J. RANSOM.)
New York: Macmillan, 1914. Pp. 483.

For all its bulk, this book is little more than the elaboration, or reiteration, of a single thesis, derived from Schopenhauer and Goethe, namely, that genius consists in objectivity, in contrast to a subjective self-seeking. While the ordinary man is limited by personal ends that control all his activity, the genius has the power of becoming absorbed in an object and interested in it for its own sake, or, we may say, loving it. Absorption in a sensed object gives esthetic contemplation—in an object conceptually thought of, philosophy; and absorption in an act makes that act play as opposed to the drudgery of the ordinary worker. A genius of action—Alexander, Cæsar or Napoleon—though perhaps selfish in petty affairs, is in the main devoted to realizing ideas by which he is possessed. “For the very reason that the man of genius, deep down in his heart, neither fears nor hopes anything and is untroubled by anxiety for the present life or the hereafter, he can devote himself to his work with all his soul, with a love which is disinterested—disinterested taken in the wider sense as exemplified by the man who, in all sensations, thoughts, and actions does not always in bitter earnest keep in view the ultimate practical result to himself or to others connected with him, but rather, as if playing some game, takes delight in the object itself to which his sensations, thoughts, or actions tend” (p. 276). Objective absorption reveals itself in the keen sense for reality, and the energetic living in the present, of such men as Cæsar and Napoleon. That which most

opposes genius is the Care of Goethe's Faust, the *elpis* or hope and dread for the future of the myth of Pandora's box, the "knowledge of good and evil"—*i. e.*, consideration of advantage and disadvantage—of the Biblical Fall of Man. Genius, as known to men of genius, is portrayed by Shakespeare in Hamlet, by Goethe in Faust, and by Byron in Manfred; and the author is at some pains to analyze these cases and show therein the validity of his thesis. Lombroso, of course, he will have none of; but his pet aversion is Nietzsche and the like, who exalt self-seeking and belittle devotion, truth and objectivity.

It is curious, from the psychological standpoint, that the author should identify genius with a certain attitude or interest, to the neglect of the factor of intelligence and ability.

R. S. WOODWORTH

COLUMBIA UNIVERSITY

Die Mechanik des Geisteslebens. M. VERWORN. Leipzig: Teubner, 1914. 3d edition. (Sammlung "Aus Natur und Geisteswelt," Bändchen 200.)

This little volume opens with a short chapter on "Body and Soul," which is somewhat comparable with the opening pages of Ernst Mach's "Analysis of Sensations." Here Verworn makes the somewhat singular distinction between obtaining the sensations of another man "subjectively" and "objectively." One can have the same sensations as another *subjectively* by putting oneself in the same circumstances as he is in, *e. g.*, by looking at the same thing in the same way; but *objectively* one can completely know (*restlos erkennen*) the sensations of another by making a complete study of the other's brain.

Then follow two excellent chapters on nerve physiology, with special reference to the physiological mediation of conscious phenomena. The two together form a remarkably compact, scientific, and satisfactory picture of physiological psychology, not a little of which is decidedly constructive and original. The reviewer earnestly commends this portion of the work, which if it could be obtained in English would make an invaluable auxiliary text-book. The fourth chapter, on "Sleep and Dreams," gives a theory of sleep and an exposition of Verworn's important theory of "inhibition by interference" (of nerve currents). The last chapter, on "Suggestion and Hypnosis," is of less importance, and was possibly added for the sake of popular appeal.

This is an admirable work, small as it is, and one which those, at least, who are endeavoring to carry out the behavioristic programme will certainly wish to read.

E. B. HOLT

HARVARD UNIVERSITY

Sexual Ethics: A Study of Borderland Problems. R. MICHELS. New York: Scribner, 1914. Pp. 288.

This volume, published in the Contemporary Science Series, is a wholesome, broad-minded, tolerant, and gossipy discussion, full of illustrations drawn from literature, scientific work, and personal experience. The author emphasizes the necessity for frankness, truthfulness, and simplicity in approaching the subject of sex with children, but is inclined to question the wisdom of school instruction. The ideal education in matters of sex is to have questions honestly answered by parents whenever they arise.

Michels is confident that our present standards of sexual ethics are wrong, but is not quite so sure as to the wisest method of changing them. It should be frankly recognized that every human being, male or female, has a right to normal sexual experience. The most fundamental ethical standard for the sexual relationship is that it should be founded on the deliberate consent of both participants. The immorality in our present situation has its source in economic conditions and its most evident manifestation in prostitution. Prostitution is due to the fact that large numbers of men of the middle and upper classes marry late and demand previous sexual experience which starts bad habits and low ideals of sexual life. The superfluous women of the proletariat have little chance under their social conditions to preserve their chastity, and are easily tempted by the offer of some of the luxury and ease which is so completely denied them on any other terms. The prostitute he calls the old maid of the proletariat.

The only hope for correcting this state of affairs lies in developing the personality and economic independence of women. When the two sexes are on more equal social and economic terms the standards of conduct for both will gradually become the same, and will approach more nearly those now maintained for women, though they will be interpreted in a more liberal and sympathetic spirit than at present. One important element in bringing about such a change is to teach the duty of the voluntary limitation of the size of families with reference both to economic conditions and to

the development of the personalities of the parents. Women should have broader interests than at present and be educated to make a wiser adjustment among the conflicting demands of husband, children, and personal development.

The chapter on comparative sexual psychology in various countries is disappointing because it contains only the psychology incidental to a description of the love-making customs of modern Europe.

HELEN T. WOOLLEY

CINCINNATI, OHIO

The Musical Faculty. Its Origins and Processes. W. WALLACE.
London: Macmillan, 1914. Pp. viii + 228.

The chief interest which this book may have for the psychologist rests in the more or less acute observations of a musician in his own field, together with certain conclusions approximating closely to long accepted principles of psychology. The naive and tentative manner in which such conclusions are drawn is, at least, refreshing (by way of illustration, the author's theory of perception as being the resultant of a large number of stimuli). The work as a whole is highly unsystematic. Indeed, the musical faculty is regarded as a phenomenon so peculiar that it eludes such investigators as Helmholtz, Stumpf and Gurney. Psychology is referred to as a word somewhat out of favor, "having become a pass-word for a great many crude ideas." The chief contention seems to be that there is no standard of excellence in music. Its center of gravity is constantly shifting. There is little or no development to be noted from composer to composer. The influence of heredity is inconclusive, while the association of genius with mental abnormality is vigorously contested. The book ends with a bibliography which gives some eighty odd titles of heterogeneous works.

R. M. OGDEN

UNIVERSITY OF KANSAS

The Feelings of Man: Their Nature, Function and Interpretation.
NATHAN A. HARVEY. Baltimore: Warwick and York, 1914.
Pp. viii + 276.

The feelings, we gather, according to this author, include pleasures and pains, emotions, sentiments and moods, also such experiences as warmth, hunger, thirst and fatigue. The now

familiar distinction between pain and unpleasantness is rejected, as is also that between "physical" and "mental" pain, which differ, we are told, only in degree. What, then, is the common element of "feeling" in these experiences? The answer is that feeling is affective process, and by affective process is meant "any kind of a mental process that has for its conspicuous characteristic pleasure or pain." Here, however, we encounter a difficulty. If, as is claimed, pleasure and pain are merely "properties" or "tones" of feeling, what, we ask, is it that has these properties? Pleasure and pain are notoriously universal; they attach to any and every kind of experience and often appear more conspicuously in connection with cognitive processes, as, *e. g.*, certain memories and expectations, than in some cases of emotion, as, *e. g.*, anger, which is usually more definitely characterized by impulsive tendencies than by affective tone. Why, then, is not every mental process accompanied by pleasure or pain affective and, consequently, a feeling? Or, if there is a specific feeling process of which pleasure and pain are the attributes, what is the nature of this process? And why, if there be such a process, should the several kinds of experience referred to above be specially selected and grouped together as "the feelings"? The author does not meet the difficulty on psychological grounds, but proceeds from the formal definition to a physiological theory.

The theory is as follows. Feeling, it is contended, is "the concomitant of the resistance which a nervous impulse encounters in passing through a nervous arc." Other mental processes, or features of the total mental process, are held to correspond to other factors of the current. Thus, while feeling corresponds to the energy "stopped out" or "destroyed," sensation corresponds to the impulse passing through the brain centre. This, it is claimed, clearly discriminates between feeling and sensation and also, in principle, between feeling and the intellectual processes generally. Consciousness, which properly means awareness, is a frequent but non-essential accompaniment of mental processes and corresponds to the irradiation of the impulse into fringing cells that are neither motor nor glandular. Memory is concomitant with the reinstatement of a nervous impulse in the same brain centre that it passed through before and its radiation into the same fringing cells. Attention is the concomitant of the process by which a nervous impulse is directed into and through a brain centre; the resistance in positive attention is increased, in negative diminished, the vari-

ation being presumably due to the shifting of the dendrites. Will is the concomitant of the driving force of the current, plus attention, which directs the force. Finally, the ego is the concomitant of the transmission of the impulse through cells that have been traversed before.

One can but admire the simplicity of the construction, in which respect it accords with the psychological simplification which is made of the whole of the individual's experience into sensation, feeling and consciousness. This opens up large and fundamental questions, which obviously cannot be entered into here. One general remark, however, may be permitted, namely this: whatever the value of such hypothetical constructions as these for psychology—and the present writer rates them at the lowest—they must at least correspond to analysis of the facts. It is in vain to plead the advantage of stating mental facts in physiological terms because of the difficulty of picturing them always "in visual, auditory or tactal images" (p. 29): why should they be so pictured? Why "picture" them at all? It is admitted that they are directly observable; at any rate, they have the right of way. Judged by this rule, the hypothesis here propounded seems in part dubious and in part false. The clearest illustration, perhaps, is that of memory. As the author himself points out, analysis shows plainly that memory is more than the mere faint reinstatement of a past experience. It includes not only re-recognition, but recognition as of something known or experienced in the past. The experience, in fact, is unique; new factors emerge and even the sensuous content, in respect to which the two experiences are most comparable, is variously modified. Is it then credible that, as the theory asserts, it should have no other basis than the passing of the current through the same identical cells? Identity of concomitance would seem to imply identity of experience, in kind, if not in degree. Here we have a *generatio æquivoca*.

On the same principle objections may be brought against the theory of feeling. The distinction between the passage of a current and its resistance is clear enough, and it is easy to say that sensation corresponds to the one and feeling to the other; but it is equally obvious that this distinction does not in the least enable us to discriminate between sensation and feeling and to determine, e. g., whether pain or warmth is to be correlated with the one process or with the other. In any case the diversity of the experiences grouped together as "the feelings" would seem to demand a corre-

sponding diversity in the concomitant physiological processes; the difference, *e. g.*, between the feeling of warmth and the feeling of rage cannot well be reduced to a difference of intensity. But even if we grant that they are in a peculiar manner different manifestations of a common nature called "feeling," it is hard to reconcile the admitted differences in the properties of this common nature with the notion that they are correlated with nothing but differences in the amount of resistance or "stopped out" nervous energy. The author, indeed, actually contends that pleasure and pain are not specifically different, but differ rather quantitatively than qualitatively (p. 94). This is incredible, and the argument to support the contention, namely, that a feeling of painful tone may pass over into one of pleasurable tone, and conversely, lacks cogency. Our ability to give meaning to the expression no more justifies us in supposing that the one "property" becomes the other than the "passing over" into zero of a quantity at the limit of a diminishing series justifies us in assuming that something becomes nothing. Another consequence of the theory is that, with a given amount of nervous energy, feeling and intellect are in inverse ratio. Possibly this is true, but it seems to have little bearing on the concrete question whether, in a given case, intellectual work is stimulated or obstructed by feeling. The conception of a given quantity of energy is general and abstract, like the conceptions of the current and the arc; why should not the energy concomitant with feeling liberate other energy, set other currents running in other arcs? We are told, to be sure, that intellect and feeling vary directly as the strength of the current, but since they vary inversely to the resisting power of the arc, the interpretation which the author himself puts on the "law" is adverse to the claim that feeling is ever a spur to intellectual activity. That sudden and strong emotions disturb the flow of the activity they invade and sometimes arrest thought altogether, is a commonplace; and this fact, favorable to the interpretation, accords badly with the theory that intellect and feeling vary directly with the strength of the current. But is the same true of sentiments and moods, or even of all emotions? The author cites as an illustration the interference with the learning of lessons produced by an invitation to take a longed-for journey. But this seems irrelevant. The invitation is likely enough to set up an abundant flow of imagery, of plans of travel, etc., and we have no standard as yet for measuring the amount of such cognitive processes as against that involved in the learning of lessons. And

when, ignoring the effect of pleasurable interest, the very best intellectual work is said to be done with least fatigue when *no* feeling accompanies the process (p. 149), the theory loses touch with experience altogether. We are not after this surprised to find the opinion that men of great intellectual eminence who were also men of deep feeling would have greatly increased their intellectual output if they had employed all their energy in intellectual work, letting none of it be destroyed by feeling (p. 153). Abstractly the proposition seems a truism; in the assumption that energy is destroyed by feeling it merely transcribes the hypothesis. But it may be very much doubted whether the wide-eyed student of human nature would not pronounce somewhat differently on the facts, which, moreover, are by no means all of the same order.

Similar objections to the theory arise in connection with the view here set forth regarding the relation of feeling and action. The view current among many of the shrewdest observers—one involuntarily thinks of Hobbes and Hume—is that the great driving force in human life is to be found in the passions. If we include among "the feelings" those of hunger, thirst and sex, the scope of this opinion is manifest. Our author, however, holding that feeling is the concomitant of energy resisted (or, as he sometimes writes, "destroyed") and that the concomitant of the energy passing through the arc is the idea, maintains that the driving force in action corresponds to the idea and that feeling enters into the motive only in the selection of the action to be performed (p. 271). This is hard to believe. Conation seems to be an aspect of all vital process and to go on often with a minimum of idea, or with no idea at all. And where idea is present, it seems impossible, except on the exigencies of the theory, to thus distinguish in the motive the selective function and the driving force. The lover seems impelled no less by his affection than by his imagination; neither apart, but both together appear to be at once selective and the force which drives him on.

The claim, then, that the theory conforms to all the facts of feeling does not seem to be justified, but whether it is or not it is impossible to say apart from a clearer definition of feeling. The book, moreover, is lacking in historical perspective, and shows an exaggerated sense of the contrast between the "old" psychology and the "new." It represents as the common opinion that feeling is a pure activity of a self-existent entity called mind, uncaused by anything "except the self-activity of the mind itself," so that

"the mind can feel as it wishes to feel, no matter what may be the nature of the intellectual process that precedes" (p. 15), and, since no authorities are cited, the statement cannot easily be refuted. But this is certainly not the opinion of any reputable writer. There are modern psychological theories of feeling, such as those of Lipps, Ward and Stout, which are quite worth studying, and physiological psychology, witness Hartley and Bonnet, is not the product of the past twenty-five years. In particular, the theory of affective phenomena has been predominantly physiological from Hippocrates down.

H. N. GARDINER

SMITH COLLEGE

Nervous and Mental Diseases. A. CHURCH AND F. PETERSON.
(8th rev. ed.) Philadelphia: Saunders, 1914. Pp. 940.

This work, now in its eighth edition, has been extensively recommended by teachers and used by students, and for purposes of teaching the main facts regarding nervous and mental diseases is excellent. Like many other medical textbooks, however, it is not scientifically satisfying either for a student desiring more than the elements, or for the practitioner who desires to diagnose and understand his patients. It is unfortunate that because of the personal predilections of the authors, or it may be to prevent too great expense to the publishers for a thorough revision, some well-recognized mental diseases remain under the section of nervous diseases, and certain diseases have not been suitably classified and dealt with. As an example of the latter may be cited "sleeping sickness" which, although in many respects similar to general paralysis of the insane, is classed under the general heading of symptomatic disorders, section of disorders of sleep. In the same section hypnotism is dealt with. Only custom can be appealed to to sanction the inclusion of such frankly admitted mental diseases as psychastenia and hysteria in the part of the book devoted to nervous diseases, and to reserve for the mental disease portion of the book only those which can be grouped under the headings insanity and feeble-mindedness.

The treatment of psychological topics is short of being satisfactory. There are many bold statements of mental-cerebral relations which are open to question, and some which give a clear view of the inadequate psychological conceptions of the average medical man. Thus, we are told that "a stimulus to the eye arouses

a sensation in the occipital lobe," and that memory pictures are stored up in the cortex.

SHEPHERD IVORY FRANZ

GOVERNMENT HOSPITAL FOR THE INSANE

The Origin and Nature of the Emotions. G. W. CRILE. Philadelphia: Saunders, 1915. Pp. vii+240.

This volume is made up of nine more or less related papers read before various associations, chiefly medical, in the years 1910 to 1914. The subject of the title is referred to illustratively in several and is specifically treated in a paper on "Phylogenetic Association in Relation to the Emotions" dating from 1911. The theory propounded is the familiar one that "emotions are primitive instinctive reactions which represent ancestral acts." The evidence is largely derived from experimental and clinical studies of fear. It is pointed out that fear is probably exhibited only by animals whose natural defense is nerve-muscular,—not, for example, by the skunk and armadillo; that the organs and tissues stimulated are those actually utilized in a physical struggle for self-preservation; that experiment discovers in extreme or prolonged fear physiological and histological changes analogous to those of fatigue; and that clinical evidence tends to show that fear, when unaccompanied by physical activity using up the activating secretions from the thyroid, the adrenals and the hypophysis, is more injurious than, apart from gross injury, actual physical contest. Fear, then, is to be regarded as a response to phylogenetic association with physical danger. *Mutatis mutandis* a similar hypothesis applies to anger and love; fear is preparation for flight, anger for attack, love for copulation. But the activities stimulated are not consummated; part of the theory appears to be inhibition of action. When the "stimulations are sufficiently strong, but no action ensues, the reaction constitutes an emotion" (p. 76). An analogy is found between an animal under the influence of fear and an automobile with clutch thrown out and the engine racing at full speed; the machine doesn't go, but it may tremble.

This inhibition of action constitutes a problem for the phylogenetic theory. The usual explanation is that it is brought about by changed conditions with no new organs to meet them, and this is the explanation adopted by our author (p. 61). In the case of civilized man custom and convention play their part also. But does the same explanation apply to savages and the lower animals? Savages are commonly represented as living in perpetual fear, and

on p. 27 of this book is a lurid picture of a bird fascinated by a snake as illustrating a creature dominated by this emotion; why is action inhibited in these cases? Moreover, in some cases what we find is not so much inhibition of all action as an apparent break-down in the coördination of factors within the teleologically conditioned response. What is the cause and what is the meaning of this failure? Some twenty years ago Dewey proposed an explanation which went far to satisfy the conditions at once of genetic theory and of psychological analysis; in particular he definitely related the ill-adapted response to the feeling of disturbance in the emotion. Crile, who habitually confuses emotions, as feelings, with motions as reactions, does not conceive the problem. His chief contribution is to link up the biogenetic theory of the emotions with a mechanistic view of psychology (fifth paper) and a theory of disease (sixth and seventh papers). Whatever value may attach to the other theories in this connection, the theory of emotion, a somewhat hasty generalization in any case from the study, practically, of the one emotion of fear, seems to fall below several that have been attempted along the same general lines of phylogeny in that it fails to meet important questions regarding both the constitution and conditions of the response and the relation which it bears to the constitution of the subjective experience.

H. N. GARDINER

SMITH COLLEGE

REPORT

JOINT COMMITTEE ON STANDARDS FOR GRAPHIC PRESENTATION

PRELIMINARY REPORT PUBLISHED FOR THE PURPOSE OF INVITING SUGGESTIONS FOR THE BENEFIT OF THE COMMITTEE

As a result of invitations extended by The American Society of Mechanical Engineers, a number of associations of national scope have appointed representatives on a Joint Committee on Standards for Graphic Presentation. Below are the names of the members of the committee and of the associations which have coöperated in its formation.

WILLARD C. BRINTON, *Chairman*, American Society of Mechanical Engineers. 7 East 42d Street, New York City.

LEONARD P. AYRES, *Secretary*, American Statistical Association. 130 East 22d Street, New York City.

N. A. CARLE, American Institute of Electrical Engineers.

ROBERT E. CHADDOCK, American Association for the Advancement of Science.

FREDERICK A. CLEVELAND, American Academy of Political and Social Science.

H. E. CRAMPTON, American Genetic Association.

WALTER S. GIFFORD, American Economic Association.

J. ARTHUR HARRIS, American Society of Naturalists.

H. E. HAWKES, American Mathematical Society.

JOSEPH A. HILL, United States Census Bureau.

HENRY D. HUBBARD, United States Bureau of Standards.

ROBERT H. MONTGOMERY, American Association of Public Accountants.

HENRY H. NORRIS, Society for the Promotion of Engineering Education.

ALEXANDER SMITH, American Chemical Society.

JUDD STEWART, American Institute of Mining Engineers.

WENDELL M. STRONG, Actuarial Society of America.

EDWARD L. THORNDIKE, American Psychological Association.

The committee is making a study of the methods used in different fields of endeavor for presenting statistical and quantitative data in graphic form. As civilization advances there is being brought to the attention of the average individual a constantly increasing volume of comparative figures and general data of a scientific, technical and statistical nature. The graphic method permits the

presentation of such figures and data with a great saving of time and also with more clearness than would otherwise be obtained. If simple and convenient standards can be found and made generally known, there will be possible a more universal use of graphic methods with a consequent gain to mankind because of the greater speed and accuracy with which complex information may be imparted and interpreted.

The following are suggestions which the committee has thus far considered as representing the more generally applicable principles of elementary graphic presentation:

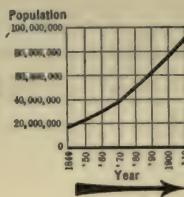


FIG. 1



FIG. 2

2. Where possible represent quantities by linear magnitudes as areas or volumes are more likely to be misinterpreted.



FIG. 3

3. For a curve the vertical scale, whenever practicable, should be so selected that the zero line will appear on the diagram.

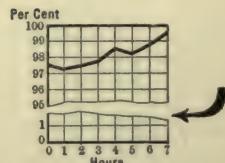


FIG. 4

4. If the zero line of the vertical scale will not normally appear on the curve diagram, the zero line should be shown by the use of a horizontal break in the diagram.

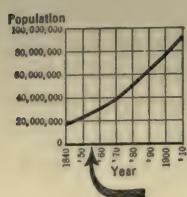


FIG. 5A

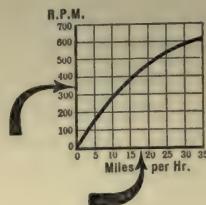


FIG. 5B

5. The zero lines of the scales for a curve should be sharply distinguished from the other coördinate lines.

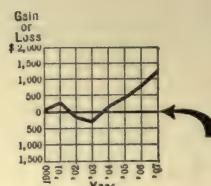


FIG. 5C

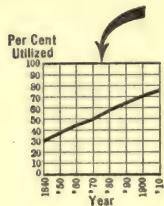


FIG. 6A

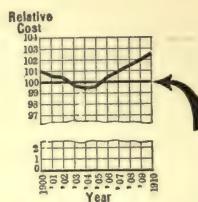


FIG. 6B

6. For curves having a scale representing percentages, it is usually desirable to emphasize in some distinctive way the 100 per cent. line or other line used as a basis of comparison.

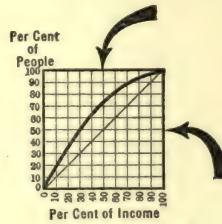


FIG. 6C

7. When the scale of a diagram refers to dates, and the period represented is not a complete unit, it is better not to emphasize the first and last ordinates, since such a diagram does not represent the beginning or end of time.

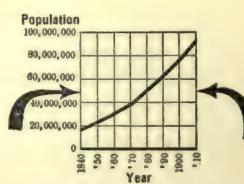


FIG. 7

8. When curves are drawn on logarithmic coördinates, the limiting lines of the diagram should each be at some power of ten on the logarithmic scales.

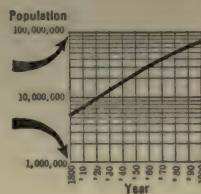


FIG. 8

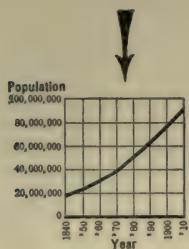


FIG. 9A

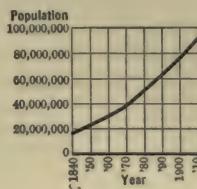


FIG. 9B

9. It is advisable not to show any more coördinate lines than necessary to guide the eye in reading the diagram.

10. The curve lines of a diagram should be sharply distinguished from the ruling.

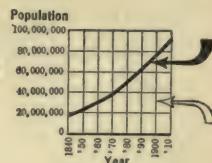


FIG. 10

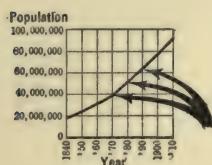


FIG. 11A

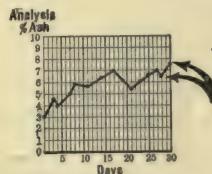


FIG. 11B

11. In curves representing a series of observations, it is advisable, whenever possible, to indicate clearly on the diagram all the points representing the separate observations.



FIG. 11C

12. The horizontal scale for curves should usually read from left to right and the vertical scale from bottom to top.

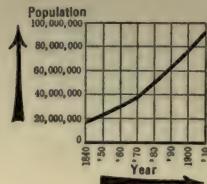


FIG. 12

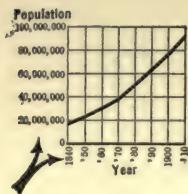


FIG. 13A

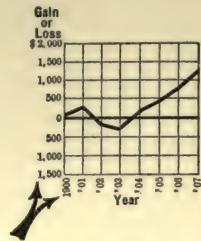


FIG. 13B

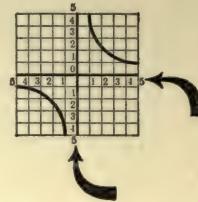


FIG. 13C

13. Figures for the scales of a diagram should be placed at the left and at the bottom or along the respective axes.

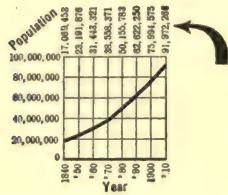


FIG. 14A



FIG. 14B

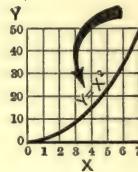


FIG. 14C

14. It is often desirable to include in the diagram the numerical data or formulæ represented.

15. If numerical data are not included in the diagram it is desirable to give the data in tabular form accompanying the diagram.

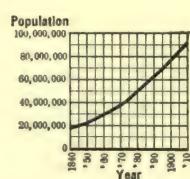


FIG. 15

Year	Population
1840	17,069,453
1850	23,191,876
1860	31,443,321
1870	38,558,371
1880	50,155,783
1890	62,622,250
1900	75,994,575
1910	91,972,268

16. All lettering and all figures on a diagram should be placed so as to be easily read from the base as the bottom, or from the right-hand edge of the diagram as the bottom.

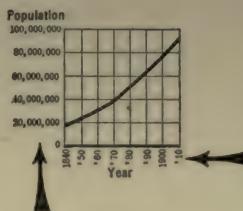
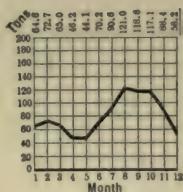


FIG. 16

17. The title of a diagram should be made as clear and complete as possible. Sub-titles or descriptions should be added if necessary to insure clearness.



Aluminum Castings
Output of Plant No.
2, by Months, 1914.
Output is given in
short tons.

Sales of Scrap Al-
uminum are not in-
cluded.

FIG. 17

EDITORIAL ANNOUNCEMENT

Plans for starting the new *JOURNAL OF EXPERIMENTAL PSYCHOLOGY* which were announced in the *PSYCHOLOGICAL BULLETIN* for February 15, 1914, but which were temporarily postponed on account of the abnormal situation abroad, have been completed. It is now definitely decided to start the new *JOURNAL* next year. The first number will appear February 1, 1916. The *JOURNAL* will be issued bimonthly, alternating with the *PSYCHOLOGICAL REVIEW*. The two periodicals will be uniform in size and type.

Beginning with the next volume the scope of the *PSYCHOLOGICAL REVIEW* will be limited to the more general phases of psychological research, including statistics, historical studies, and theoretical discussions.

The *JOURNAL OF EXPERIMENTAL PSYCHOLOGY* will be devoted to the technical investigations of the psychological laboratory; to the illustration, description, and control of apparatus; and to the development of new methods of procedure.

HOWARD C. WARREN,
JOHN B. WATSON,
JAMES R. ANGELL,
SHEPHERD I. FRANZ,
MADISON BENTLEY.

BOOKS RECEIVED

- HERRICK, C. J. *An Introduction to Neurology.* Philadelphia: Saunders, 1915. Pp. 355. \$1.75.
- JASTROW, J. *Character and Temperament.* New York: Appleton, 1915. Pp. xviii + 596. \$2.50.
- BERGSON, H. *The Meaning of the War.* (Introd. by H. W. Carr.) New York: Macmillan, (no date). Pp. 47.
- HOLMES, A. *Backward Children.* Indianapolis: Bobbs-Merrill, 1915. Pp. 247. \$1.00.
- TAUSSIG, F. W. *Inventors and Money-Makers.* New York: Macmillan, 1915. Pp. ix + 138. \$1.00.
- MACINTOSH, D. C. *The Problem of Knowledge.* New York: Macmillan, 1915. Pp. xviii + 503. \$2.50.
- JELLIFFE, S. E. & WHITE, W. A. *Diseases of the Nervous System.* Philadelphia: Lea & Febiger, 1915. Pp. xiii + 796.
- LUCIANI, L. *Human Physiology.* Vol. III. (Trans. by F. A. Welby; pref. by J. N. Langley; ed. by G. M. Holmes). London: Macmillan, 1915. Pp. x + 667. \$5.00.
- CONN, H. W. *Social Heredity and Social Evolution.* New York: Abington Press, 1914. Pp. vi + 348.
- HARDY, T. J. *The Religious Life.* London: Longmans, Green, 1913. Pp. 300.
- RICKLIN, F. *Wishfulfillment and Symbolism in Fairy Tales.* New York: Nervous & Mental Disease Pub. Co., 1915. Pp. 90. \$1.00.
- GIVLER, R. C. *The "Conscious Cross-Section."* Seattle: Univ. of Washington, 1915. Pp. vi + 412.

NOTES AND NEWS

A SIX-WEEK summer school will be established at the George Washington University in the summer of 1916, under the directorship of Professor W. C. Ruediger, dean of the Teachers College in that institution.

H. D. Kirson has been appointed instructor in psychology in Harvard University.

THE twenty-fourth annual meeting of the American Psychological Association will be held at the University of Chicago, December 28, 29, and 30, 1915. The Hotel Del Prado, 60th and Blackstone Streets, has been selected as headquarters. The annual dinner-smoker, with the address of the president, Professor J. B. Watson, will occur at the Quadrangle Club on the evening of December 29th. The local member of the executive committee in charge of the meetings is Professor H. A. Carr of the University of Chicago. Communications which concern the program should be addressed to the secretary, Professor R. M. Ogden, University of Kansas, Lawrence, Kansas.

THE following items have been taken from the press.

DR. JOSEPH E. DE CAMP, of the University of Illinois, has been appointed instructor in psychology at the University of California.

G. HEIMANN, a pioneer in the field of eugenics, and H. Piper, extraordinary professor of physiology in the University of Berlin, well known for his contributions to the functions of the special sense organs, have been killed in the war.

DR. G. M. WHIPPLE has been advanced to the grade of professor at the University of Illinois.

THE
PSYCHOLOGICAL BULLETIN

GENERAL REVIEWS AND SUMMARIES

SOCIAL PSYCHOLOGY

BY JAMES H. LEUBA

Bryn Mawr College

It is a satisfaction to the psychologist to find an anthropologist (1) affirming in a sociological review the necessity for the sociologist to make use of psychology in the interpretation of social phenomena. That an important place belongs to individual, and a still larger one to social psychology in the treatment of sociological data is after all so evident to those who know something of psychology that only gross ignorance of that science can account for the attitude of those for whose benefit Lowie writes.

Two illustrations are used to indicate the possible usefulness of psychology to sociology: (1) the bearing of the psychology of dreams upon Tylor's theory of the origin of the belief in souls and in their survival of bodily death; (2) the significance of curious non-logical associations known as synesthesia, in particular the connection existing in the savage mind between number and its "mystic" value.

The discovery of uniformities in mental processes may help to solve vexing problems regarding the unity or diversity of origin of cultural traits. To demonstrate as does Lévy Brühl that the mystic property of number seven among Malays is not derived from their belief in the existence of seven souls, but that the reverse is true, is only a beginning. One must ultimately account for the existence in individual minds of the preëxisting numerical category.

Darwinism and Sociology (2) is a vigorous paper against the Darwinian assumption "that the amazing difference in cultural

level between the various peoples of the globe are due, wholly or mainly, to corresponding differences in innate mentality, and that these in turn were caused by the selection of natural and acquired structural modifications." The author affirms the contrary opinion that "culture is solely explicable by culture, and that every people is innately prepared to adapt itself to any civilization however high." In support of his opinion, Spiller reviews briefly recently gained information on the sensory measurements and the mentality of primitive populations, observations of the mental capacity shown by inferior races when transplanted in the *milieu* of cultured races, the relation of brain weight to mental development, and he attacks the conclusion of researches on the heredity of genius (Galton), and of abilities (Pearson's school). Before yielding his assent to a thesis which, in a less radical form, is familiar to readers of anthropological literature, the reader will want an opportunity of taking up one by one in a thorough manner the many points of the discussion.

The object of Hobhouse and his collaborators (3) is to ascertain whether there is any correlation between the types of material culture and social institutions. They distinguish first two types of material culture, lower hunters and higher hunters. From this second stage of culture development may take one of two directions; ascend through successive stages of the agricultural or of the pastoral type. In the second article the conclusion is reached that "both in extent and in internal quality, the development of social order considered here essentially as the maintenance of justice is roughly correlated with advance in economic culture."

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1. LOWIE, R. H. Psychology and Sociology. *Sociol. Rev.*, 1915, 21, 217-229.
2. SPILLER, G. Darwinism and Sociology. *Sociol. Rev.*, 1914, 7, 232-253.
3. HOBHOUSE, L. T., WHEELER, G. C., & GINSBERG, M. The Material Culture and Social Institutions of the Simpler Peoples; an essay in correlation. *Sociol. Rev.*, 1914, 7, 203-231, 332-368.

SOCIAL CUSTOMS AND ORGANIZATION

BY W. H. R. RIVERS

Cambridge University

The two papers by Radin (2) and Hocart (1) furnish a valuable contribution to the psychology of magic and religion. According to a widely accepted view magic depends upon a belief in some power inherent in objects and rites, this power being impersonal, immaterial, and in some cases all-pervading. This view rests almost entirely upon observations in Melanesia and North America and it is with these two regions that the authors deal. They bring forward positive first-hand evidence entirely opposed to the idea that magic rests upon impersonal power and they show clearly that the concepts which thus illustrate the nature of magic are of equal, if not greater, importance in the psychology of religion.

Dr. Radin's work has been done among the Winnebago and Ojibwa whose *wakanda* and *manito* have frequently been cited in favor of the prevailing view. Dr. Radin can find no evidence among either people of a belief in impersonal power apart from definite spirits. Thus if a thing is *waka* among the Winnebago it is because it belongs to a spirit, was given by a spirit, or is in some way connected with a spirit.

The Oceanic concept upon which the advocates of impersonal power rest their case is that of *mana*. Mr. Hocart shows by many examples that *mana* is an attribute of spiritual beings or of dead or living human beings. In Polynesia and in some parts of Melanesia *mana* is definitely the attribute of chiefs and of the ghosts of chiefs. Only in the Banks Islands do we hear of it as an attribute of spirits which have never had human form. Even in those islands, however, there is no evidence of its impersonal character, but its connection with spirits is perfectly definite.

Mr. Hocart's evidence does not conflict with that collected by earlier workers. In his region the dispute is about the interpretation of the evidence rather than about the nature of the evidence itself. In North America the case is different. There is not merely a divergence of opinion about the interpretation of evidence, but the new evidence directly contradicts the old. The subject is of such importance that the matter cannot be allowed to rest in this stage. New researches directed to the further study of the facts are imperatively needed. All that can now be done is to point

out the remarkable coincidence that two wholly independent inquirers should have worked in the two strongholds of the advocates of a belief in impersonal power and should only have found evidence wholly inconsistent with this belief.

Mr. Hocart's paper deals only with this special problem, but that of Dr. Radin has a much wider scope and is a most valuable summary of existing knowledge concerning the religion of the North American Indian. Of especial interest to the psychologist are the rôles which he assigns to a specific religious feeling and to the shamanistic interpretation of popular belief.

In accordance with the prevailing tendency among students of North American culture, the discussion of the paper rests upon the assumption that this culture is the result of a process of independent evolution. It is a question, however, whether the key to many of the problems, including that of the nature of shamanistic influence, should not be sought in the contact and blending of cultures. Dr. Radin's paper suggests that there is much in the Pre-Columbian religion of North America which will only become intelligible if such contact and blending have had far more influence than is at present conceded by the majority of students.

The starting-point of the book by Elliot Smith is the discovery of the close resemblance between the process of mummification of the dead in Torres Straits and that current in Egypt at the time of the twenty-first dynasty, a resemblance in so many points of detail as to leave little doubt that the practice must have spread from one region to the other. A study of the distribution of mummification then showed a close correspondence with that of a number of other features of culture of the most diverse kind, including the building of megalithic monuments, the cult of sun and serpent, divine kingship, the svastika, tattooing and the piercing and distension of the ear-lobe. Relying on the criterion of common distribution, reinforced occasionally by evidence of other kinds, Elliot Smith concludes that the people who carried the art of mummification from Egypt to Torres Straits not only distributed this practice to the other regions where it is found, but took with them also the customs which are found side by side with it in so many parts of the world.

The idea that such a heterogeneous medley of customs can have arisen independently in the most diverse environments is absolutely rejected by Elliot Smith who concludes that the grouping came into being through a process of blending somewhere in the

neighborhood of Egypt and was carried thence over the world by means of migration.

It is impossible to consider here the mass of evidence brought forward in this book. It must suffice to point out its importance to the students of social psychology. They cannot ignore the question whether the similarities of culture found in widely separated places are the result of transmission or of independent origin. If a custom or belief has been carried ready-made from one part of the world to another, its nature can only be used with the greatest caution as evidence of the psychology of the people to whom it now belongs. We can be confident that an introduced custom will only survive if the mental atmosphere of its new environment is favorable to it, but we can be equally confident that this mental atmosphere cannot furnish a complete explanation of the custom. This must depend on a knowledge of the history of the custom before it reached its present home.

If the contact and blending of peoples have had the far-reaching influence indicated by recent ethnological research, attempts to seek the explanation of the social life of a people by means of interaction between their collective mind and its environment cannot meet with success. Such attempts can only succeed after the history of human culture has been the subject of long and patient study. Meanwhile there still remains ample scope for social psychology in the study of the ideas and sentiments which underlie the social activity of every part of the world, and in using this knowledge to explain the transformation which social products undergo when they are introduced into a new environment.

The aim of Rivers's little book is to illustrate a principle in the method of sociology. The prevailing tendency in this science is to explain social processes by means of psychological laws. This should doubtless be the ultimate aim of sociology, but in the present condition of our knowledge of social psychology, we are only trying to explain the more by the less known. The main idea which underlies the argument of "Kinship and Social Organization" is that the immediate business of sociology is the investigation of the coexistences, sequences and inter-relations of social facts without attempting any psychological explanation and with the adoption of as few and as simple psychological assumptions as possible. When a body of laws concerning the social coexistences, sequences and relations has been formulated we shall be in a position to con-

sider how far these laws can be expressed in terms of their psychological equivalents. According to the author the creation of such a body of knowledge is a necessary step in the development of a science of social psychology.

With this aim in view the book is devoted to the study of the connection between the terminology of relationship and forms of social organization, the examples being drawn chiefly from Melanesia, though India and North America are also drawn upon for illustrations. It is shown that many details of systems of relationship are capable of explanation as the direct results of forms of marriage, and that the three main varieties of such systems have grown out of three different forms of social organization. The author concludes by pointing to the strictness of the scientific determinism governing the department of sociology with which the book deals. He urges that it is only by showing the existence of such determinism throughout the whole range of the subject that sociology can expect recognition as a science.

REFERENCES

1. HOCART, A. M. *Man*, 1914, 14, 97.
2. RADIN, P. Religion of the North American Indians. *J. of Amer. Folk-Lore*, 1914, 27, 335.
3. RIVERS, W. H. R. *Kinship and Social Organization*. London: Constable, 1914. Pp. vii + 96.
4. SMITH, G. E. *The Migrations of Early Culture*. Manchester: University Press, 1915. Pp. vii + 143.

CRIME AND SOCIOLOGY

BY ANGIE L. KELLOGG

Watertown, N. Y.

Statistics.—The most urgent need of criminology is that of statistics. The Chicago Council Committee on Crime (34) emphasizes the fact that the police and judicial statistics of Chicago are wholly inadequate and incomplete; and urges the collection and publication of the numbers of crimes known to the police, frequency of these crimes, number of habitual offenders, number discharged who have been arrested and tried and who have been held in the police station or county jail, length of the term of persons sentenced, amount of fine, nationality, occupation, and age of offender, and disposition made of him. Koren (27) advocates

the establishment of state bureaus endowed with sufficient authority and properly equipped for the collection of such elementary statistics as enumerated above. An article by von Grabe (20) is valuable not so much for its results as for its attempt to discover by a statistical investigation the after effects of correctional training. Another valuable statistical attempt (43) is a comparison of juvenile delinquency in England and Germany by Strieve.

Causes of Crime.—The majority of crimes are assigned to mental deficiency. The Chicago Council Committee on Crime (34) states that there are evidences of serious disturbances of the nervous system in at least fifty per cent. of the female prisoners of the Chicago House of Correction, and that the mentality of these prisoners is of the moron class. Olson, McCord, Vaughan, Pyle, Spaulding and others strongly emphasize the close relationship between crime and mental deficiency. Clarke (6), however, maintains that the whole correlation between prostitution and amentia is still undetermined. In this connection, he comments on the fact that the intelligent escape the court; and he emphasizes the need for the establishment of norms for women of the same industrial class as that from which prostitutes have come in order that comparisons may be made. He states, as a most conservative and accurate estimate, that one half of those who come into the custody of institutions for correction and reformation are mentally defective. Weidensall (48) also argues for the need of norms, at least of the lowest and average degrees of intellectual capacity which a law-abiding woman must have to earn a living. She claims that at present neither the Binet tests nor Goddard's adaptation of them are adequate to determine the subnormal among such offenders as go to Bedford Reformatory. Bronner (4) claims that statements made as to the number of defectives among delinquents have been misleading; inasmuch as studies have been made of highly selective groups, such as are found in many detention homes. In this connection, she also comments on the fact that the brighter delinquents are not caught. She further holds that tests have been used indiscriminately and under adverse conditions; that defective sight, ill health, bad habits, and language deficiencies have been ignored as ostensible causes of mental dullness. Of five hundred and five children of the detention house, Cook County, Illinois, less than ten per cent. were adjudged feeble-minded.

Various articles discuss the physiological and social causes of crime. The Chicago Council (34) emphasizes physical defects,

and, under defective environment, bad conditions in the home and the school, irregularity of employment and poverty. It also strongly emphasizes the enormous influence which alcohol has in inciting men to deeds of violence and the close relationship between prostitution and the use of alcohol and habit-forming drugs, and finally the pernicious effect of "crime systems," consisting of the professional criminal, the police lawyer, the "fixer," "fences," and the corrupt politician, all assisted by inadequate police patrol, police collusion and our antequated criminal procedure. Frank (13) looks upon sexual anomalies as manifestations of disease. Hall (21) asserts that too considerable a proportion of juvenile delinquency is furnished by working children. Strieve (43) finds as causes of juvenile delinquency in England the wide social distinction between upper and lower classes, absence of proper physical and mental recreation, and alcoholism.

Criticism of Criminal Procedure.—Gibson (16, 17) writes two articles on the codes of Connecticut and Pennsylvania which are very valuable as evolutionary and comparative studies of codes with reference to the bearing thereon of religious, social, and political conceptions, to their efficiency and to motives underlying their modification. The Chicago Committee, McCord, Peyton, Whitman, Olson, Vaughan, Abbott, Lisle (34, 32, 37, 49, 36, 47, 1, 28) and others continually advocate the extension of the use of laboratories in connection with the court. The Chicago Committee, Adelman, Slopter, Ferrari, Goldman, and Myers (34, 2, 41, 9, 19, 35) all urge the necessity of a public defender in order primarily that the indigent accused may have justice. They claim that in this way can be abolished the Grand Jury, the barbarous Third Degree, and legal technicalities of various sorts.

Vaughan (47) would require the judge to be versed in criminology and the present-day jury to be replaced by trained psychologists and physicians. In respect to the police system, the Chicago Committee enumerates the following defects; lack of publicity regarding police statistics, a follow-up system for criminal complaints, effective supervision of patrol, effective control of detective work, discipline, and aggressiveness. Fosdick (11) recommends great care in the selection of the superior and inferior officers, practical and theoretical training of the police, and an absolute divorce of police administration from politics. The jail system is most severely criticized. Whitman (49) argues that the county jail should be used solely as a house of detention for diagnosis and

prognosis. Robinson (40) condemns the idleness of the jail, its lack of mental and moral uplift, and its association of old and young offenders. He advocates that several counties unite to reduce the number of jails. It would then be possible to employ a high salaried and competent man and to install machinery. Von Hentig (24) claims that the jail sends out offenders refreshed for crime. Myers (35) declares that there is no more efficient teacher of crime and indolence than the county jail. Dowling (7) finds jails, lockups, and police stations, on the whole, hygienically pernicious.

There are several considerations of identification systems and reliability of evidence. Fosdick (10) discusses the passing of the Bertillon system and recommends the finger-print system as superior. Lotz (30) illustrates the fact that in reporting an isolated fact about a well-known person one's account is unconsciously colored to accord with his general knowledge of the person. Kobler (25) shows by experiment that excitement improves the observation and memory of a witness up to a certain point; impairs it beyond that point; and that agreement of witnesses may merely mean agreement of erroneous testimony. Benussi (3) contrived a mechanical jury by means of a Marey pneumograph; and found that decisions of a human jury are right on an average of fifty-five per cent. of the cases, while the mechanical jury was almost infallible.

Treatment of Offenders.—The principle of criminology is to treat offenders according to their needs and possibilities and not according to their crimes. It is this motive which establishes laboratories in connection with courts and reformatories. Abbott, Garrett, Lisle, McCord, von Hentig, Whitman, Pyle, Peyton, Olson, The Chicago Committee, Weidensall, and Spaulding (1, 15, 28, 32, 24, 49, 39, 37, 36, 34, 48, 42) all claim that on the basis of examination, made in these laboratories, it will be possible to make clearing houses of jails and detention homes, from which a criminal may be sent to a farm colony, a hospital, an asylum, a custodial for the feeble-minded or a training school, or he can be released on probation, according to his adaptability and needs. This principle of treatment obviously requires an indefinite sentence, a fact which is emphasized by the writers above mentioned. The Chicago Committee advocates the payment of fines on the installment plan so that the poor offender shall not be discriminated against in the matter of imprisonment. It advocates that prostitutes be put in institutions and not fined; that prisoners addicted to drugs be

given a cure in hospitals; that prisoners be paid for services rendered and, out of their earnings, money be sent to their families. This last measure is widely advocated by Robinson, von Hentig, Gault, Abbott and others (40, 24, 14, 1). A great deal of discussion has centered around the best system of utilizing prisoner labor and the consensus of opinion is in favor of the state-use system (34, 40, 42). Frank (13) would put sexual perverts under the care of physicians rather than have them sentenced by a judge. While parole and probation meet with general approval, certain phases of these measures occasionally meet with criticism. Kocourck (26) argues that the effect of probation tends to make a victim of a person injured in favor of the wrongdoer; and it also advertises to the world that a first offense brings no reproof from the state, thus encouraging commission of crimes and discouraging prosecutions. Brown (5) contends that parole systems are in need of standardization in respect to the organization which shall have power to parole, who shall be eligible as parole officer and when, and collection of statistics. The parole board should be independent. There should be enough local probation officers to secure close supervision. Lisle (28) advocates a central farm colony for vagrants. Von Hentig (24) holds that drunkenness should be treated by fresh air, regular life, work, and lack of mental friction.

Punishment.—Garrett (15) points out that punishment is a matter of administration; it has to do with individuals. The legislature deals with masses; and can, therefore, only name and define crime. The judicial branch of government can merely determine guilt and innocence. It is not sufficiently informed to pass sentence. He advocates, therefore, a board of punishment, to determine the heredity and the environment of the accused, and the length of time for his discipline, which shall depend upon the growth of his character. Von Hentig (24), writing about recidivists, asserts that punishment has failed in their cases because they were incapable of forming inhibitory associations and were indifferent to bodily discomforts. Lisle (29) argues that punishment is necessary as social sanction, if we are to have society; but as soon as the word punishment contains the idea of expiation it becomes inaccurate. Neither are the ends of punishment reformation and repression merely; for, then, social protection is lost sight of. Prevention is to be the keynote of our future criminal law. Punishment, therefore, can only play its part hand in hand

with treatment of offenders advocated by alienists, doctors and sociologists.

Preventive Methods.—The Chicago Committee finds the crime problem not merely one of police and courts but one of public sanitation, education, living wage, industrial democracy and adequate institutions and colonies. Vaughan (47) maintains that the prevention of crime is to a considerable degree a matter of preventive medicine. He advocates for every city laboratories to analyze water, food and blood; and he would require every house to be opened for sanitary inspection. Mendelsohn (33) would have schools during the summer months to root out the evils of vacation idleness, street life, and unsupervised activities. Flexner (8) to prevent prostitution, advocates general, social amelioration; knowledge of venereal diseases, better wages, better homes and amusements, and decrease in the consumption of alcohol.

The Cause and Cure of Crime by Henderson (23) is a short book written for the great body of people, who are ignorant of the subject of crime and to whom belong the duty and power to change conditions. To this end, it considers modern criminological tendencies; personal acquaintance with prisoners and life histories as the only means of learning how men become antisocial; different ways of grouping offenders, each way being useful for a different purpose; the need of criminal statistics; the causes of crime, such as mental defects, unfavorable bodily conditions, drugs, and especially alcohol, the value of laboratories with departments of psychology; sociology and nervous pathology in connection with the court; the value of having trained persons as officers in correctional institutions; the efficiency of the indeterminate sentence; the payments of fines in installments; restitution from the earnings of the offender to the victims of crimes against property, payments to the family of the criminal; the state-use system of prison labor, the necessity of general information as to criminal procedure, and general, social and industrial amelioration.

Lowrie's *My Life out of Prison* (31) and Taylor's *The Man Behind the Bars* (44) are both very valuable popular books, most convincing by their concrete illustrations drawn from their many experiences of prisons and prisoners, of the failure of a repressive penal system and of the criminal attitude of society toward ex-convicts, of the evils of alcohol, the need of suitable work for prisoners and the failure of punishment under existing economic conditions.

Feeble-Mindedness: Its Causes and Consequences (18) to a considerable degree discusses how much the problem of crime, immorality, pauperism and alcoholism resolve into those of feeble-mindedness. Goddard estimates that from twenty-five to fifty per cent. of our prison population, fifty per cent. of prostitutes, and fifty per cent. of the inmates of alms-houses are feeble-minded. The so-called criminal type, then, is a type of feeble-mindedness, which has been misunderstood and mistreated and driven into criminality, for which he is naturally fitted. Not hereditary criminality, but hereditary feeble-mindedness accounts for the conditions. Thus the hypothesis to be employed in the problem of crime is that there are all grades of intelligence from practically none to the highest, and hence all grades of responsibility. The degree of intelligence which carried a person through life under simpler conditions of society is inadequate in many of the complex social conditions of today. On this view the problem of criminality can be solved partly by adaption and partly by elimination. When we measure intelligence, we measure responsibility; and thus have a guide for treatment. We know whom we can adapt and whom we must eliminate. The moron class is the most dangerous, because they so strongly resemble normal persons and yet are so fundamentally incapable. If elimination is to be accomplished, in general segregation and colonization are essential; and sterilization, wisely and carefully practised, will be efficient in solving certain individual cases. Imprisonment is unjust and irrational treatment of feeble-minded offenders.

The Individual Delinquent (22) is a detailed account of a five years' intensive and comparative study of individual offenders who have come before the author through the Juvenile Court of Chicago. The author gives a comprehensive view of the causes of delinquency; hereditary factors in developmental conditions, ante-natal, natal, post-natal, senility, physical conditions, peculiarities and ailments, physical abnormalities, stimulants and narcotics, environmental factors, public amusements, feeble-mindedness and so on. There is no special leaning to either hereditary or environmental factors. Anthropometric criteria of criminality are broken down completely. Criminal reactions are regarded as maladjustments, so that the problem of criminality becomes one of mental and social adaptation and sanitation. The author finds no hard and fast classification of criminals possible or valuable. The great need is for constructive individual treatment.

European Police Systems (12) is a very valuable and interesting description and critical discussion of the police systems of the larger European municipalities. The author shows how the police problem varies according to economic conditions, size of city, character of its industries, nature of the population, and national traits and traditions. In England, the duties are confined to maintenance of order, pursuit of criminals, and regulation of traffic. In Germany, and also, to a considerable extent, in Austria and France there is hardly a government activity that is not more or less directly connected with the police. In Germany and Austria they have legislative powers, and in Germany they have also judicial functions, and are, therefore, more or less autocratic. The two types of police organization are the decentralized, which is constructed around a single function and is the simplest and most effective; and the centralized, which centralizes miscellaneous functions in one department. The latter exists on the continent; the former, in England. Schools for practical and theoretical training of police generally prevail in Europe. The most elaborate is in Vienna. In England, the police are chosen from private life; on the continent they are generally chosen from the army, so that obviously the attitude of the continental police is militaristic in addition to being autocratic, as mentioned above. On the whole the public confidence in the police and the integrity of the police of Europe is in marked contrast to the public distrust and the police corruption which exists in the United States. In Europe politics has nothing to do with the police. In detecting crime, the laboratory method is widely employed. The author discusses identification systems, record files, the superiority of dactyloscopy over anthropometry, the need of international cooperation in the detection of criminals, of simplification of diplomatic formalities, uniform systems of identification, common police codes, universal extradition treaty, and international notification service and crime indexes. The book has eight appendices which state the moneys expended in certain of the larger cities for police services, the strength and qualifications of the police, and their mode of appointment. There are also seven charts showing the organization of police departments of London, Berlin, Paris, and Vienna, and of the detective bureaus of Berlin, London, and Paris.

The Physical Bases of Crime; a Symposium, (38) is a very valuable collection of articles by the most highly regarded criminologists, physicians, judges, and psychologists. They consider many

topics in relation to crime, such as the court, adolescence, insanity, feeble-mindedness, alcohol, drugs, medicine, head injury, syphilis, hereditary diseases, parental habits, and so on. It is to be regretted that the limitation of space prohibits a consideration of the conclusions drawn.

Boyhood and Lawlessness and *The Neglected Girl* (45, 46) are studies of West Side delinquents in New York City. They give a detailed account of all the influences that make the West Side juvenile delinquent; as, nationality of the community, numbers, parents, moral standards, street life, poverty, poor housing, powerlessness of the police and of the court, impossibility of enforcing the school law and many other matters fundamental to child development.

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RELIGIOUS PSYCHOLOGY

BY JAMES H. LEUBA

Bryn Mawr College

Georges Berguer (1) has provided a detailed and comprehensive, though very brief exposition, together with running critical remarks, of the achievements of the psychology of religion. He considers successively the literature on normal and on abnormal religious psychology, and the theories regarding the origin and the nature of religious phenomena. A very full bibliography is added.

Nothing of especial significance was published during the past year regarding the nature and the origin of religion. Of the articles and books here mentioned five (2, 4, 5, 8, 9) may prove interesting to the average reader; they will hardly arrest the attention of the specialist.

Hayes (2) singles out four roots out of which grew religion: magic, zoomorphism, ancestor-worship, inspiration, and miracle. His analysis of the several factors entering into the making of religion is far from adequate. The author is apparently not very familiar with the literature on the origins of religion.

The most curious proposition of Gaultier's paper (3) is the one expressing his conception of the religious "sentiment." It is said to be the concomitant of an absolute approval of existence in its totality and at every instance of its development. It implies a justification of existence in its entirety. From this understanding of religion it follows that the ethical religions are irreligious, for they imply the imperfection of existence and offer means of modifying it so as to give to it some degree of the perfection it lacks. It

follows also that there can be no genuine religion outside of a mysticism transcending the dualism of good and evil. It is in the Buddhistic doctrine of illusion that the author finds the starting point of a legitimate mysticism.

The present religious unrest prompted the writing of *The Religious Instinct* (4). The author endeavors to point out the fundamental nature of religion and ends with the plea that "we should commit ourselves wholly to religion, as taught and administered by the Church." The author's definition of religion is in no way unusual: consciousness of God and desire for union with Him. But he becomes singular when he dubs "instincts" the activities by which man becomes aware of the existence of God and the desire for union with Him. The wish to place religion on an unshakable foundation is doubtless largely responsible for the readiness with which authors who are not psychologists bestow the name "instinct" upon religion.

In Shepherd's brief paper (5) are set down with hardly any attempt at establishing them, a number of theses regarding the origin of the primitive gods.

Teslaar's review of the work of the American psychologists in the field of religion (10) besides being very superficial, is often incorrect, and at times absurd.

The studies devoted to particular aspects of religious experience (6, 7, 8) are neither numerous nor of very great importance. Carveth Read (6) writes interestingly upon magic. One regrets that the great extent of the field he embraces, compels him to a certain sketchiness. The topics treated are the beginnings of magic, its nature, its several forms, its relation to mystery, and its evolution. The author's conception of magic agrees with that of Westermarck and of the reviewer. Yet he defines it as "a connection of events imagined to be constant and to depend upon the presence of some thing or activity possessing an efficacious quality or force, and not to depend upon any particular person." This definition differentiates magic from animism but not from mechanical causation. This last form of causation, involving a quantitative relation between cause and effect, is not assimilated by the savage with magical causation.¹ His derivation of Will-Magic from other primary forms deserves attention. It does not seem advisable to me to consider taboos as outgrowths of primitive magic. Taboo, it is true, like most magic, is dependent upon belief in mysterious

¹ Comp. *A Psychological Study of Religion*, pp. 5-7, 151-164, 177-190.

forces, but this does not by itself warrant the subordination of taboo to magic.

Truc (7) accepts, it seems, the teaching of the Roman Church. He puts down the definition of Faith and "Grace" given by Church and Fathers as authoritative, speaks of theology as an "*parfaite science*" and is clearly unable to approach his topic from the point of view of, and with the knowledge now possessed by, modern psychology.

An attempt is made in *Psychoanalysis and Mythology* (8) to turn to account in the interpretation of myths some of the theories of Freud. Myths are divided into two groups; the Nature Myths and Hero or Culture Myths. The latter are "the fancy-realization of the suppressed emotions and wishes which could not be fulfilled in any other way. They are the dreams of the childhood of the race in which the individuals imagine themselves in the positions described in the sagas."

Marrinan (9) deplores the depletion of churches and finds its cause in the failure of religious teaching. He blames not so much that which is taught as the methods of teaching, the "decadent religious pedagogy," and he implies that a better pedagogy would save the situation. Sunday School teaching is no doubt bad, but it is probably because Sunday School religion is in important respects unacceptable to the educated classes that a wide-spread disregard for its teaching has spread. The fundamental question before the Christian church is not "How shall we teach?", but "*What* shall we teach?"

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RECENT PUBLICATIONS ON MYSTICISM¹

BY GEORGE A. COE

Union Theological Seminary

Pending further development of experimental methods we are obliged to rely, for the chief data of mysticism, upon literary records of one sort or another. Psychology profits directly, however, from records of introspective impressions and valuations. For example, the search for witnesses to a supposed mystical revelation common to all religions brings to light deep contrasts within mysticism itself, and not merely between it and the non-mystical. The Quest Series (1, 9, 15) places side by side the mystical union (Jewish, Christian, and Muslim), which asserts itself as fulness of experience, and the early Buddhist Jhāna-consciousness or emptying of the mind, which contains no reference to a merging into something else (15, pp. 114 f.). The Zen sect of Buddhists, too (10), whose teachings modern Japan "has acknowledged as an ideal doctrine for her rising generation" (p. xii), connects no supernaturalism whatever with its yoga-like practises. Moreover, these two types, the full and the void, appear to take opposite attitudes towards magic and theurgy. Jhāna-consciousness claims to be a vestibule to psychic phenomena that range all the way from clairvoyance to levitation (pp. 126 f.). This is early Buddhism. But early Sufism decried reliance upon miracles (9, pp. 130 f.), and Christian mysticism as a whole has belittled hallucinations, and has had scant dealing with what the German language calls *Mystizismus* (3, 5, 13, 19). These two opposing tendencies Royce (16) discovers in John Fox, who experienced both "openings" (discernment of spirits, etc.) and the Light (a calming, unifying influence).

Another profound difference between types comes to light in an attempt to evaluate mysticism for modern life (3). Alongside of nature mysticism and contemplative mysticism, both of which tend to make individuality illusory, there has been a personal mysticism which focalizes the individual in an effort to produce social consciousness. Mysticism has been blamed for its individualism, yet praised because its inmost principle is love. May not the praise and the blame refer, after all, to different things that

¹ The Freudian interpretation of mysticism, the progress of psychic research, investigations of the social consciousness, and of immediacy and the time process, are here omitted on the ground that they should naturally appear in other notices.

bear a common name? From the data now before us it is clear that the assertion, to which James gave the weight of his name, that there is a common mystical experience in the different religions and outside of them, must be reexamined. There are violent differences of type in what is called mystical. How much these types have in common we do not yet know, or whether indeed there is any reason at all for a common name. In view of this situation, detailed description of experiences even from an ecclesiastical point of view, either Catholic (13) or Protestant (3, 5), has value, much more so (in spite of uncritical psychology) such a large-minded apology as Underhill has given (19). Her attempt (20) to prove that Christianity was fully mystical from the start, as against the common opinion that mysticism entered Christianity through Neo-Platonism, may be found to contribute to the proof of types rather than of uniformity.

On almost all hands there is asserted the continuity of mystical experiences with the common life. This, if I mistake not, is a new drift. Ames (2), essaying a functional analysis, finds that mysticism arises from the same impulses as science, but seeks to satisfy them by a short-cut method. Taylor (18) looks upon mysticism as "one path among others, all leading to the same goal, the realization of the whole personality in such a way that it shall be real through and through." Peabody (11) holds that Quaker eminence in social reform is directly connected with Quaker mystical practises. Jones (7), advancing beyond his former assent to mystical theory, sees in the experience not a "way" of either knowledge or life but rather a more effective use of ordinary resources. Buckham (3) and Underhill (20) maintain that even the "way" of the great mystics can be used in common, everyday life. It is significant that Underhill's attempt to teach the ordinary layman causes her psychological notions to gain in simplicity and clarity. Pollock (12) holds that the central position of mysticism is compatible with any philosophy, materialism included. Dixon (4) connects literary inspirations, in respect to both content and form (rhythm, imagination), with the problem of reality. Finally (6), ritualistic Anglicans are finding fellowship with Quakers in the common use of prayer without words.

From the opinion that mysticism is a set of fantastic doctrines psychology first advanced to the view that it is a set of pathological phenomena. Today we are distinctly beyond this position. Even extreme mystics, as Delacroix has shown, attain a more stable will,

a more firmly organized personality by means of their mystical practises. A remarkable example at the present moment is the steadiness of the Bahaists in both preaching and practising universal brotherhood in the face of direst persecutions (22). Here prophetism reappears in all its pristine vigor, and here appears the power of religion that is not yet mechanized.

The continuity of such extreme cases with everyday conduct lies in the fact that personal and social experience as a whole seems to secure organization and control of itself by reference to something that is not in experience at all—that is, in the scientifically orthodox sense of “experience.” Bergson (8) solves this paradox by revising the notion of experience, but Bertrand Russell insists upon sharpening it in the orthodox sense (17; cf. 14). After denying the traditional metaphysics of mysticism (intuition, unity, the unreality of time), he declares that “good and bad” are nothing but “reflections of our own emotions on other things, not part of the substance of things as they are in themselves” (p. 799). For psychology, one may conclude, the problem of mysticism—at least the chief problem—is, What is realization? In particular, what part therein has desire or the selectiveness of attention?

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THE TASK AND THE METHOD OF PSYCHOLOGY IN THEOLOGY

BY JAMES H. LEUBA

Bryn Mawr College

German theologians have of late frequently discussed, and at times with apprehensive interest, the significance of psychology for their discipline. Many of these theologians are university professors whose students hear also the lectures of the German masters of psychology and philosophy. It would seem, therefore, highly desirable in a journal devoted to psychology to set forth as fully as possible the point of view of this group of men, in so far as it concerns the relation of psychology to their science. This would be well worth while even though nothing more should be gained than a definite understanding of their points of agreement and of disagreement with the professional psychologist.

Wobbermin's book (3), to which the larger part of this review is devoted, embodies by far the most formal effort made so far to set forth a psychological method for the use of theologians. His book might well serve as an introduction to what in German theology deserves the attention of the psychologist, since he discusses most of the important works related to his subject, particularly those of Schleiermacher, Herrmann, Kaftan, Troeltsch, Fries, Frank and Biedermann.

In book I (pp. 1-244) the place of theology in the system of

the sciences is considered. Book II (pp. 245–465) treats of the *religionspsychologische Methode*. In a general way, Wobbermin takes sides with H. Rickert against Dilthey, Sigwart, and Wundt, on the question of the classification of the sciences into nature and culture sciences, instead of into physical and psychic sciences. The science of religion, or theology—these two words being used synonymously—constitutes one of the culture sciences, *i. e.*, it is one of the sciences concerned not with the form of experience but with its value.

But theology occupies a special place among the culture sciences. It is concerned with truths for which it claims an absolute value; they are standards for the appreciation of all other values. Thus theology ever raises the question whether culture in its efforts toward the subjugation of nature does not, after all, rest satisfied with what is merely superficial, whether the values which its several particular sister-sciences seek to realize are the highest, the absolute values. In raising this question, theology reaches beyond the other culture sciences, it becomes a *criticism of the culture sciences*, *i. e.*, a metaphysics (pp. 60–64, 76).

In order to fulfil its task this metaphysical culture science must follow the *religionspsychologische Methode*, a method valid in both parts of systematic theology (the one referring to historical development, the other to the essential contents of religion), the adoption of which would produce the long desired uniformity in the procedure of theologians.

It is the second part of this book that chiefly interests the psychologist. What is this psychological method thus offered as *the* method which is to make possible the solution of the theological problems?

The task of theology is described as the discovery of the essential content of religion and of the fundamental motives and tendencies expressed in religious faith-convictions. As these motives are usually not the only ones entering into the formation of religious ideas and beliefs, they must be separated from the non-religious motives. However useful the analysis of individual experience may be in the performance of this task, one's own religious experience and that of others may serve merely as a preparation for the study of biblical revelation. The Holy Scripture, as testimony of faith (*Glaubens Zeugniss*) and revelation, is alone authoritative. Individual experience must be altogether subordinated to the Scripture, which is both the historical source of the Christian religion and the norm of Christian experience. The main task which the

method is to achieve is the discovery of the true religious motives of the faith-convictions expressed in the varied figurative or symbolic forms in which religious life appears in the Bible (pp. 436-437).

We observe first, and with some surprise, that our author calls the method a *transzendental-psychologische Methode*. Why transcendental? The psychologist is surely not in the habit of regarding any of his methods as transcendental. Wobbermin does not mean that psychology is to reach conclusions regarding the truth of religious faith; psychology deals altogether with the phenomenal. It can merely observe the presence in religion of faith in a transcendental object, of the conviction of the truth of that faith, seek for motives accounting for these phenomena, and record their consequences. If Wobbermin chooses to use the term transcendental, it is merely because "psychological analysis must be conducted altogether from the point of view of the paramount interest which religion feels in its truth" (p. 75). This is in our opinion not a sufficient reason for describing the method as transcendental.

Wobbermin insists upon the necessity for religious psychology to proceed under the guidance of the *Wahrheitsinteress* of religion. The essential and specific content of the Christian faith is, we are told, a faith-conviction of its truth, of its absolute value. This is set down by Wobbermin as a fact, previous to any investigation. A psychologist would require this proposition to be established by an analysis of the contents of Christian experience. He would also wish to investigate the grounds or motives of that conviction. Wobbermin bars the way with the dogmatic affirmation that although faith comes to knowledge in religious experience, it is nevertheless felt to be completely independent of that experience—not conditioned by it, but conditioning it. He insists as against Heinrich Maier that the reality of the objects of faith instead of being identical in kind with the reality of the objects of knowledge, is, on the contrary, "completely different both in qualitative and in quantitative respects." "God and divine things are not and cannot be objects of human knowledge" (*Wissens und Erkennens*). They are altogether objects of faith. Theology is to be regarded as *Offenbarungs-Lehre* because the Christian religion is in the strictest and fullest meaning of the word a revealed religion (p. 109; also pp. 388-391).

It is evident that Wobbermin does not pretend to provide either an empirical or a metaphysical proof (in the ordinary sense) of the reality of the religious object. For he finds in the "affirmation of

faith" the highest possible ground for assurance of the objective existence of God; the absolute value of religion is *given* with even greater certitude than is the reality of the objects of empirical experience. Belief in a revelation is the hall mark of religious consciousness (p. 390). This claim, he tells us, is of the essence of every religion (p. 389). He is thus, with regard to this fundamental proposition, in agreement with the theologians who may generally be classed as Ritschlians, and he separates himself from Troeltsch who assigns to metaphysics the task of establishing the truth of the religious convictions.

However comfortable to the believer may be the opinion that the conditions which raise any particular mental content to the dignity of a faith-object do not fall within the pale of scientific inquiry, it is not an opinion acceptable to the psychologist. He knows that the objects of faith are psychologically determined as much as any other object; and he refuses to forego the kind of analysis which in another field results in the classification of the objects of experience into external object, image, and hallucination.

We get into a new difficulty with this transcendental psychological method—which after all is not transcendental at all—when we are told that a psychology exclusively empirical cannot be an adequate psychology of religion. This time again it turns out that the difficulty is one of terminology. Wobbermin uses "empirical" in a restricted sense, from which the historical sciences are excluded (pp. 46-47). Not that the data on which they work are different in nature, but that they deal with will-relations. That part of the psychology of religion, by far the most important according to Wobbermin, in which individual religious personalities are studied in the spirit of history, is not "empirical" science. This seems an unwarranted and unfortunate restriction of the term "empirical."

A volume is announced in which the *Methode* is to be applied systematically. In the present large book there is but one illustration of its use and of the kind of results it yields. The idea of the Kingdom of God appears in the New Testament under two forms. In some places it is represented as an earthly kingdom governed by Christ himself, returned among men for the fulfillment of His great purpose. In other places, the Kingdom of God is evidently not a physical reality, but a purely ethical conception. It comes into existence when God reigns in the human heart. The correct solution of this problem is of paramount importance in Christian thought. History is unable, we are told, to solve satisfactorily

the apparent antagonism of these two biblical conceptions. Neither can it account for the troublesome circumstance that the earthly Kingdom, announced as imminent in the time of Christ, has not yet been realized. It is here that the *Methode* steps in and provides the reconciling answer. It asks what is the religious motive, or, more specifically, what faith-conviction is expressed in these apparently conflicting accounts? Wobbermin answers: "The thought of the immediate appearance of the Kingdom of God expresses the completeness of the conviction of the men of the New Testament in the absolute worth of the spiritual Kingdom of God, a Kingdom above time and space" (pp. 460-462). That this conviction forms the nucleus of the New Testament eschatology is clearly expressed in many places, for instance in John, xvii: 3. What, then, can the apostle have meant when elsewhere he seems to believe in an earthly Kingdom: "For the hour is coming, in which all that are in the graves shall hear His voice, and shall come forth; they that have done good, unto the resurrection of life; and they that have done evil, unto the resurrection of damnation" (John, v: 28, 29). The motive once discovered, it becomes quite evident in Wobbermin's opinion that in this passage John designedly used sense-imagery to express his faith in the final triumph in man of the eternal God (pp. 463-4).

In another publication (*Zum Streit*) Wobbermin has applied the *Methode* to the question of miracles. He cannot admit that all the Biblical miracles have taken place as related. By means of the *Methode* he discovers that some of them are merely attempts to express in material imagery an altogether spiritual meaning.

I shall leave to others the ungrateful task of showing the large element of arbitrariness in these "psychological" solutions, but I cannot refrain from saying that this complicated attempt at a demonstration of the insufficiency of other methods and the labored discussion of the right *religionspsychologische Methode* become somewhat grotesque in the light of the only instances of its application so far provided by the author. It is also probably superfluous to remark that there is nothing new in this method. It has always been one of the recognized tasks of psychology to discover motives in order to explain behavior or opinions and beliefs. That which the psychologist will note as unusual, without finding in Wobbermin's work sufficient reason for accepting, are limitations imposed upon the psychology of religion. The psychologist, I take it, will not be willing to subordinate religious experience in general

to the particular experiences related in the Bible, and to regard them as norms; neither will he consent to be guided in the formulation of his problems exclusively by the interest which the Christian, as well as any other religionist, feels in the truth of his faith-convictions. It is the Christian Theologian in Wobbermin which would contract the outlook to what can be seen from this particular and narrow point of view. The psychologist will insist that religion is a form of behavior or attitude, intended, like all forms of behavior and attitude, to secure certain values; and he will consequently be guided in his inquiries by this broader conception. He will, moreover, hold that in order to be adequate a psychology of religion will have to be comparative, that it cannot remain within the manifestations of a single religion.

The rôle which William James is made to play in the development of the *Methode* deserves a final remark. He appears to Wobbermin as the continuator of Schleiermacher and his own precursor. For, in the mind of our author, James has had the exalted merit of recognizing in the immediate experience of the divine the specific nature of religious consciousness. This recognition is called by Wobbermin epoch-making in the history of theology because it makes possible a correct formulation of the essential religious problem (pp. 275-284). That this is the chief value of the work of James in the field of religion, few will admit. But I must refrain from discussing this point. I shall only draw attention to the very significant fact that for James the "specific" character of religious experience is shared by all the states of consciousness he called "mystical," including *every form of intoxication*. The upsetting implication for theology of this extension of the meaning of "mystical," Wobbermin prefers not to consider.

Troeltsch (1, 2) separates himself from Wobbermin and, in general, from the Ritschians in that he does not acknowledge a specific revelation. He rejects the faith-metaphysics and affirms instead the uniformity and the similarity of human experience: "It is altogether out of the question to seek in Christianity for another causality than in non-Christian experience," and he speaks disparagingly of the theology which deals in "extra-mundane and extra-human certitudes."

He does not, however, turn over religion altogether to psychology. Empirical science is incompetent to solve the essential problems of religion. This is true, according to him, with regard to all the culture sciences; no empirical method can solve their essen-

tial problems. Religion is in the same position as æsthetics and ethics. The science of religion—an expression synonymous for him, as for Wobbermin, with theology—cannot rest satisfied with what empirical science is able to do, *i. e.*, analyze, describe, classify phenomena and discover their relations and the conditions under which they come and go. The science of religion is concerned with the question of the truth of religious experience and not only with a causal treatment of the facts of experience. The essential problem of theology is thus epistemological.

Troeltsch accuses the psychologist of trespassing upon the province of the metaphysician in that from analysis and classification he passes to judgments upon the truth and value of religion. And as he is usually unaware of his flight into metaphysics, the psychologist claims that his conclusions are those of empirical science. These psychologists are simply raw metaphysicians, usually prepossessed in favor of positivism, who, therefore, reach conclusions adverse to religion.

This attack upon the psychologist is justified only when he presumes to establish the truth of transcendental objects. For my part, I have never done so. For the gods of the religions with which I have been concerned are not identical with the Absolute of the metaphysician. They are beings known by their alleged actions upon the physical universe, or upon man, or both. They are empirical inductions similar in kind to ordinary scientific induction. The belief in the *impassible* Absolute Reality which the philosopher calls "God" would never have given rise to any one of the historical religions. This essential distinction between the gods of religion and that of metaphysics the theologian ignores; therefore he continues to accuse the psychologist who concerns himself with the validity of the empirical god-hypothesis with unwittingly entering the pale of metaphysics.¹

Troeltsch breaks with the Ritschlians when they affirm that the truth of religion is *directly given* in a faith-experience. He holds, it is true, that truth is to be sought and discovered in experience; but this does not mean, for him, that religious truth is a generalization on the basis of discovered empirical facts. If it were so, the truth of religion would be a problem for empirical science, and this Troeltsch strenuously denies. No, religious truth is a truth universally valid, enjoying *a priori* existence in the mind, and reveal-

¹ See Chap. XI, Theology and Psychology, of my book, *A Psychological Study of Religion*.

ing itself in the concrete facts of religious experience. It is an *a priori* truth in the same sense as the categories of space, time, and causality are *a priori*; they are of the very nature of mind, they express its universal constitution.

In order to solve the essential problems of religion one must then, according to Troeltsch, pass from the field of empiricism into the field of rationalism. His rationalism is that of Leibniz and of Kant, a formal rationalism, immanent in experience, discovering itself in experience; and not the speculative rationalism which would derive analytically, from general propositions, conclusions referring to particular facts.

In laying the foundation of their theology the Ritschlians place the whole emphasis upon the necessary truth of the values affirmed in religious conviction, and upon a separation of theoretical from practical reason. Herrmann, for instance, affirms that theology rests upon the presupposition that there are experiences belonging to the individual life which we regard and must regard as expressing absolute truth, even when we realize the impossibility of conceiving of them as universal laws or categories of thought. To those holding this opinion, Troeltsch addresses the fatal criticism that they lose sight of the question of the reality of the object (God, the Absolute) to which the values are attached and that, consequently, their system is an elaboration of mere desire. Against their view he maintains that there are universally valid laws of religious consciousness which are to be discovered in the diversity of religious life in which they find expression. The search for these laws constitutes the main task of the science of religion.

It appears to me that the fundamental proposition of Troeltsch, namely, the affirmation of *a priori* law, or laws, of religious consciousness, different from those obtaining in every other field of experience, remains completely unsubstantiated. It is apparently nothing more than an affirmation born of the desire to make religion a law unto itself. It is the very same desire which leads the Ritschlians to divorce theology from science and from "rationalistic" metaphysics. In whichever way this withdrawal of religion from the rest of the world of experience be accomplished, it is an equally arbitrary proceeding. Why should one take seriously the affirmation of Troeltsch before he tells us what these *a priori* laws are and shows us what use can be made of them? Neither discussion of method nor affirmations concerning the absolute value of religious experience, the certainty of faith-convictions, and the

a priori laws of religious consciousness may take the place of actual psychological studies of religious life. Theologians, and in particular German theologians, neglect too much the science about which they write so abundantly to be safe guides in the matter of method.

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SPECIAL REVIEWS

The Social Problem. A Constructive Analysis. C. A. ELLWOOD.
New York: Macmillan, 1915. Pp. xii + 255.

"The purpose of this little book is to furnish a brief analysis of the social problem in Western civilization and to outline a scientific social philosophy which shall serve as a basis for a well balanced progress" (preface, page vii). The social problem is now, what it has been in all ages, *the problem of the relations of men to one another* —a problem as broad as humanity. Its solution "requires a scientific understanding of the forces at work in human interrelations, and careful putting together in a right way of all the factors concerned. In brief, it requires a scientific sociology" firmly grounded on psychological principles (pp. 15, 16).

The unity of human groups is essentially a psychic or spiritual matter. "*Civilization, in other words, is at bottom the creation and transmission of ideal values by which men regulate their conduct*" (p. 21). Therefore we face the problem that Comte faced when he worked out his positive philosophy, *i. e.*, how to harmonize the hopeless conflict between the fundamental beliefs and ideas of the members of the Western society.

After considering the historical elements in the modern social problem (Chap. II), the physical and biological elements (Chap. III), and the economic elements (Chap. IV), the author comes to the decisive factor, namely, the spiritual and ideal elements (Chap. V). The key to the problem is a humanitarian ethics and religion. "By a social religion, we mean of course, one which will exalt the service of humanity over and above the service of any individual, class, nation, or even race as the highest end value" (p. 206). It must be "a *redemptive* religion, if we are to have a fully socialized ethics—one which is equal to 'bridging the gulfs' in existing humanity" (p. 213).

This solution seems hardly consistent with the psychology of the school of thinkers with whom Professor Ellwood classes himself, namely that of John Dewey and George H. Mead.

These men show that the growth of the social self is through constant identification of its interests with the interests of the group

to which it belongs. Beginning with the family and play-ground, it grows wider and wider as its contacts extend and multiply. The individual thus gradually identifies himself with his local community, his state, his nation, Western civilization, and finally humanity. The sacrifice is of the smaller to the larger self, of the habitual self to the self created by the adjustments to the higher group. He becomes aware of himself through his awareness of others, and his knowledge of himself grows with his knowledge of others, with his greater imaginative contacts and responses to an ever-widening group. It is a continuous process of growth. The conflict is only incidental to the growth.

VICTOR E. HELLEBERG

UNIVERSITY OF KANSAS

Social Heredity and Social Evolution: The Other Side of Eugenics.
H. W. CONN. New York: Abingdon Press, 1914. Pp. vi + 348.

It is refreshing to find a biologist who appreciates the limitations of physical science in interpreting social phenomena and in furnishing practical guidance for social policies. Professor Conn's book, addressed apparently to biologists, is written with the avowed purpose, however, of showing that social evolution is essentially psychic, and that those eugenists who think that they have found the solution of "the social problem" are on the wrong track. The development of humanity, he contends, has taken place through the improvement of its social rather than its organic heredity; and the hope of the future must lie in the same direction. The laws of organic evolution have but a limited application in the understanding or promotion of social progress. The key to progress must be found in "social heredity," by which the author means the handing on from generation to generation of the accumulated possessions of the race, material and spiritual. In the case of humanity, therefore, the environment, especially the "subjective" environment of ideas, ideals, and values, and the traits of character acquired by the individual therefrom, become of much greater importance than organic heredity and "congenital characters."

While the book is written ostensibly to refute the extravagant claims of the more extreme eugenists, yet Professor Conn rightly feels it necessary to develop in outline a whole system of sociology to do this. We find him, therefore, treating of everything in social

evolution from the origin of language and of society itself to the nature of moral codes and of civilization. Herein lies the interest of the book. The author naturally does not profess to be developing a system of social theory. Sociology and psychology are not referred to, nor are there any explicit references to authorities in those sciences. But as a biologist and as a man of common sense Professor Conn delivers telling blows at the biological theory of human society.

Social psychologists and sociologists accordingly cannot afford to let this work go without a careful reading, even though they may find little or nothing new in it. Of course, crudities of expression and uncritical statements, from the strict sociological and psychological standpoints, abound in the book, but as a whole it is sensibly written; and by its production the author has rendered a distinct service to all working in the field of the social sciences.

CHARLES A. ELLWOOD

UNIVERSITY OF MISSOURI

The Unconscious Reason in Social Evolution. A. E. CRAWLEY.
Sociol. Rev., 1913, 6, 236-41.

Mr. Crawley's thesis is that "man's social institutions were built up, like those of ants, bees, and wasps, by reason or intelligence (or whatever it may be styled), but not by *conscious* reason." What he means by "unconscious reason" is difficult to determine exactly; but apparently he means adaptation by the method of trial and error. He argues that "in the lower stages of mind purpose is not conscious, intelligence is not conscious"; and that many of the lower animals (the ant, e. g.,) are intelligent, but not conscious. "Man is the reasoning creature *par excellence*; but nine tenths of the work of his mind is below the threshold of consciousness." We cannot, therefore, suppose that men consciously and deliberately invented their institutions any more than that the ant planned consciously its wonderful social system.

As a protest against recent attempts to revive the Contract Theory of society Mr. Crawley's argument is timely and effective; but as an explanation of social evolution it leaves much to be desired. In what way his explanation differs from a purely mechanistic explanation he does not attempt to show. To the reader he seems to commit the fallacy of describing in psychological terms purely mechanical processes.

C. A. ELLWOOD

The Function and Scope of Social Philosophy. H. A. OVERSTREET.

J. of Philos., Psychol., &c., 1914, II, pp. 533-43.

Professor Overstreet pleads for a recognized and organized social philosophy. Philosophy has been too much occupied with criticizing the results and presuppositions of the mathematical, physical, and biological sciences. But the disorganized state of the social sciences shows that they have need of a philosophical criticism of their categories if they are ever to get organized as a truly coherent body of scientific knowledge. Professor Overstreet has no difficulty in giving striking illustrations of the need of a social philosophy from the present state of the social sciences, especially economics and politics.

Defining social philosophy, then, as "the critique of social categories," he holds that an inventory of the "master concepts" of the social sciences is its first task. These "master concepts" he finds to be (1) work, (2) sex-life, (3) æsthetic enjoyment, (4) knowledge-seeking, (5) government, (6) heeding the good (*i. e.*, ethics and religion.) It follows that the philosophy of work or industry will be the fundamental section of social philosophy upon which, Professor Overstreet thinks, all others sections must rest. Then successively must be developed philosophies of sex-life, of æsthetics, of science and education, of ethics and religion, in order to complete social philosophy.

While this article is suggestive and sensibly written, it leaves an impression of looseness and vagueness in the mind of the trained worker in the social sciences. What, for instance, is the relation between this social philosophy, as Professor Overstreet conceives it, and sociology? To be sure, he starts out with the modest program of making "social philosophy" merely a criticism of the categories of the social sciences, but he ends with the demand that a completed social philosophy include philosophies of everything from industry to religion. If these several philosophies are to be built upon the facts of history and experience, as well as upon the criticism of concepts, wherein will they differ from sections of a scientific sociology in the broad sense of that term? Again, in the same spirit Professor Overstreet fails to recognize that social psychology and social biology must be sections of sociology. A carefully worked-out logic of the social sciences would surely have enabled him to speak less vaguely regarding social philosophy. Finally, in asserting that a philosophy of work must be fundamental to all other sections of social philosophy, does not Professor Overstreet

fall into the same error as the "economic determinists"? Social philosophies we have in plenty at the present time; what we need is a scientific criticism and synthesis of the elements of worth in each of them.

CHARLES A. ELLWOOD

Socialism and Syndicalism. P. SNOWDEN. Baltimore: Warwick & York, 1914. Pp. 262.

This is the type of book on a social movement which makes the psychologist despair. No attempt is made at *psychological* interpretation or criticism of the socialist and syndicalist movements. Instead, we are met at the beginning with the dogmatic statement that "Socialism, based upon the impregnable rock of history, economy, and morality, can alone explain the causes of existing industrial and social evils, and alone submits a coherent, intelligent, scientific, and practical scheme of change" (p. 15). How a political and economic program, such as Socialism, can *explain* anything is difficult to see, unless indeed it be assumed that such a program has back of it and implicit in it an adequate scientific social philosophy. This, of course, is just what Mr. Snowden does rather vaguely assume for Socialism. Hence the futility, it would seem, of the labors of the social psychologists.

Not that Mr. Snowden is an extreme socialist. On the contrary he is of the moderate type. He criticizes Marx's theories in a mild way, but his criticisms are of the conventional sort and show no knowledge of modern psychology. In the same way his treatment of Syndicalism leaves much to be desired. He repeats the ordinary economic explanations of the syndicalist movement, and makes no attempt at a psychological analysis of it.

The book can be commended only as a sample of the literature of the social sciences when they are still in the stage in which there is little or no appreciation of the bearing of modern psychology upon social theory.

C. A. ELLWOOD

Democracy and Race Friction. J. M. MECKLIN. New York: Macmillan, 1914. Pp. x + 270.

The status of the negro, past, present, and future, is the main problem under discussion. Discarding the vague humanitarianism of idealistic philosophy, of the political equalitarians, and of the recent psychology which asserts that all peoples are roughly uni-

form in native equipment, the writer essays to interpret race friction from the standpoint of a psycho-physical social psychology. After detailing the concepts of instinct, the subconscious, custom, imitation, and group conflict which writers like Tarde, Baldwin, and McDougall advance, a definition of race is reached. Subjected to long-continued pressure from uniform conditions of life, a group develops uniform modes of physico-mental response which may fairly be termed racial. The negro, after having acquired, through centuries of selection, certain physico-mental peculiarities due to life in a monotonous, unwholesome tropical environment, was thrust into a white man's group; and a primitive sex, property, and religion *mores* of a nature people met the traditions of the Anglo-Saxon. An imperfect assimilation during slavery was upset by the doctrinaire reconstructionists, and after a generation of friction the white and the black are mentally separate. Differences will not down through constitutional amendment and theories of equality, proved by the decisions of the Supreme Court relating to the negro and the practical situation in the South today.

The negro, with his handicap, biological and mental, has, on the whole, failed to meet the fast pace of a competitive regime, and his tragedy and fate is to prove his fitness to survive, at the same time being compelled, because of the superior *mores* and control genius of a militant "race," to work out his salvation, if at all, largely within his own group.

This, in bald outline, is the main trend. Professor Mecklin states that he has no final solution of the problem, and it is one of the merits of his method of attack that he singles out the various *ifs*. The negro will grow "social and solid" *if* he advances in thrift, honesty, and vocational skill; *if* he improves upon a limited achievement in a pure family life; *if* he rationalizes his religion; *if* he cultivates a race consciousness, etc.

On the part of the white, the author says that a return to a full master-servant status conflicts with the accepted tenets of democracy. To treat the negro as a temporarily backward race, with the promise of ultimate incorporation and intermarriage would throw a too heavy strain on both groups. The conclusion favored is frankly to recognize inherent racial differences, to give the blacks, not equal opportunity, but "equal consideration" and freedom, letting the competitive struggle select the fit and eliminate the weaklings. This attitude involves a modification of previous abstract social theories.

In the mind of the reader it raises the question of ethical justification, a question not discussed at any length by the writer. A fuller statement of the implications of "equality of consideration" than the last chapter contains is necessary to satisfy the reader's query, what can be done?

Where Professor Mecklin ends his skilful marshaling and interpretation of material is surely not the end of scientific procedure. Granted the present psycho-physical inferiority of the negro and the social inequalities which have always resulted therefrom, is there anything in the way of experiment with limited groups of blacks which may throw light on their capacities when brought under new systems of stimulation? It may be that one of the ironies of the situation is that tradition and non-rational attitudes slowly built up in the "group mind" prevent the carrying out of tests. If such projects—founded upon flexible hypotheses, not group custom—are without further ado pronounced impossible, then the implications for a scientific determination of the race problem should be considered. The problem reverts to factual analysis of more or less conflicting data regarding a past or present *status quo*, and the assumptions based on the data may not be interpreted anew by placement in different contexts.

Dr. Mecklin presents a strong case, considering the complexity of the problem and the nature of the evidence now available. A wide range of material is sifted, aptly used, and expressed in excellent style. The discussion of the status of the mulatto (pp. 52-56) is of interest to psychologists who wish to trace the social causation of multiple personality.

E. L. TALBERT

Citizens in Industry. C. R. HENDERSON. New York: D. Appleton, 1915. Pp. xix + 342.

No phases of the effort for social betterment have had a more varied history than "profit sharing" and "welfare work," nor have any perhaps been less scientific in approach or more doubtful in consequence. Mr. Henderson has enunciated the fundamental reason in a quotation from Mr. Gompers: "Justice, not charity is the right of all workers. Let welfare work become what it should be—conscience work." The author has defined justice as meaning "good citizenship," implying "legal and political equality, common rights and reciprocal duties." The man does not lay aside citizenship when he dons overalls and jumper. He is still a citizen, a

Citizen in Industry, and he "never can be morally content and satisfied as long as his mind, will and voice count for nothing in the direction of the industry and its product." The discussion does not map out a program whereby employers may be led to adopt this creed, or whereby employees may be convinced that the best phases of welfare work are steps toward the ideal. But the author has presented the methods of many establishments, "the principles which underly the whole movement," and the problems yet to be solved.

The book is crammed full of information, detailed schemes for welfare work, and it will prove invaluable to those who are endeavoring to secure higher standards for industrial workers.

SUSAN M. KINGSBURY

The Natural History of the State. H. J. FORD. Princeton: Princeton University Press, 1915. Pp. 188.

In an endeavor to estimate the influence of the Darwinian theory of evolution upon political science Mr. Ford calls into service not only biological data but the data of psychology, linguistics and anthropology as well. Darwin, he finds, left unsettled the precise nature of the process of evolution that produced the human species and thus failed to define the bearing of natural history upon political science. Biology suggests that the ancestral form of the human species must have been gregarious, but it is not conclusive upon the subject. Psychological data, however, are more convincing. The community is exhibited as the being for whose advantage brain development primarily took place and as the force generating the power of forming general concepts, the conclusion being that the human mind is a social product. Linguistic data likewise point in the same direction, while anthropology throws an uncertain light.

Assuming the truth of the Social Hypothesis Mr. Ford proceeds to deduce certain corollaries with respect to political science, and it is here that the argument fails to convince. To say that "the state made man" is to create a real (as opposed to a conceptual) distinction between the state and the units which compose it; to say that man's "nature was formed by government" is to overlook the parallel fact that government was formed by man's nature, which the author admits when he offers man's needs as an explanation of community life; to say that "rights are not innate but derivative" and that they "exist in the state but not apart from it" is to consider man as still subject to the forces of nature which controlled

him before the dawn of reason. When our Revolutionary forefathers held that there were fundamental rights of life, liberty and property which no state could take away they were but laying down conditions without which continuance under the particular form of state life would be impossible; and if ethics involves reason and free will they were right.

C. G. FENWICK

Fear and Conventionality. E. C. PARSONS. New York: Putnam's, 1914. Pp. xv+239.

This clever book will afford entertainment and instruction to those curious to know the *raison d'être* of the various customs and rules of etiquette which govern the behavior of host, guest and traveler, the giving of presents, paying calls, marriage, etc. At the same time, the sociologist and the psychologist will read this volume with profit, for the author is not only clever but also learned and of good judgment. Her main effort would show that fear, or apprehension, is at the root of most of our conventions. These are not merely rationalized relics of the past, but re-expressions of a well-nigh unchangeable human nature. How subtle is at times her discovery of apprehension may be seen in the reason she assigns for women taking men's arms to go out to dinner. It is not for fear of tripping, nor is it an acknowledgement of weakness, a gesture of propitiation, it is because by that means "I raise up an imperceptible kind of barrier between us, a barrier covertly soothing to the sense of disquiet . . . the difference in sex arouses."

In the chapter on the Host, one reads "with us a well trained butler always pours a little of the wine into the host's glass before serving it to the guests, just as among the Krumen . . . the housewife takes the first drink—to take off the 'fetish' or to prove the beverage unpoisoned." That chapter ends with this generalization: The etiquette by which the host is governed "is a systematic attempt to overcome the suspicions and apprehensions always excited by the stranger."

JAMES H. LEUBA

Les Maladies Sociales. P. GAULTIER. Paris: Hachette, 1913. Pp. vi+270.

This small volume is written by a patriot who sees in social disease a serious menace to his country. He describes with vigor and com-

petence adolescent criminality, alcoholism, depopulation, pornography, and suicide, and offers such legislative and moral remedies as seem to him practicable.

J. H. L.

Assemblies. C. S. GARDNER. *Amer. J. of Sociol.*, 1914, 19, 531-555.

Assemblies may be divided into three classes: (1) the accidental concourse; (2) the inspirational gathering; (3) the deliberative body. The article discusses chiefly the second of these classes, which includes lecture audiences, theater crowds, and church congregations. The writer is especially interested in this last form of assembly. He finds that the psychological conditions are most favorable in a church congregation for effective ethical and religious work if what he calls the secondary stage of psychical fusion is not passed. "In this secondary stage the individuality of the units has not wholly disappeared. The fusion is partial only; a measure of independence remains to the average person." But if the third stage of psychic fusion is reached, when the individuality of the personal units has disappeared: "if the emotional tide runs so high as to submerge the intellectual life and drown all definite ideas in its flood, . . . no sentiment is then developed, no ideal established, but only a thirst for wild and senseless emotional intoxication which is disorganizing and debilitating in its effects upon personality. The third stage of psychic fusion should, therefore, always be avoided."

C. A. ELLWOOD

BOOKS RECEIVED

- HEALY, W. *Honesty*. Indianapolis: Bobbs-Merrill Co., 1915. Pp. x+214. \$1.00 net.
- PETERSON, H. A. *Methods of Testing School Children for Defects of Vision and Hearing*. Normal, Ill.: State Normal University, 1915. Pp. i-16.
- SCHOPENHAUER, A. *The Basis of Morality*. (Trans. with Introd. by A. B. Bullock.) New York: Macmillan, 1915. Pp. xxviii+288. \$1.25.
- HOLT, E. B. *The Freudian Wish and Its Place in Ethics*. New York: Holt, 1915. Pp. ix+212. \$1.25.

NOTES AND NEWS

THE present number of the BULLETIN dealing with social and religious psychology has been prepared under the editorial supervision of Professor James H. Leuba, of Bryn Mawr College.

AT Stanford University, Professor Frank Angell has been granted sabbatical leave of absence for the spring semester in order to make a trip to Belgium. During his absence Professor Lillian J. Martin will act as executive head of the department of psychology.

THE following items have been taken from the press.

DR. H. CHARLETON BASTIAN, F.R.S., author of "The Brain as an Organ of Mind" and works on aphasia and other neurological topics, died November 17, at the age of 78.

A ROYAL medal has been awarded by Dr. W. H. R. Rivers for his contributions to ethnography and ethnology.

DR. ROBERT BARANY, of the University of Vienna, who has contributed to our knowledge of the functions of the ear, has been awarded a Nobel prize in medicine. It is reported that Dr. Barany is a prisoner of war in Russia.

DR. T. L. BOLTON, professor of psychology in the University of Montana, who was not reappointed by the State Board of Education, has now been restored to his position but with forced leave of absence without pay for the current academic year.

THE United States Bureau of Education has appointed Professor J. R. Angell, of the University of Chicago, a member of the commission to make a survey of Iowa state educational institutions.

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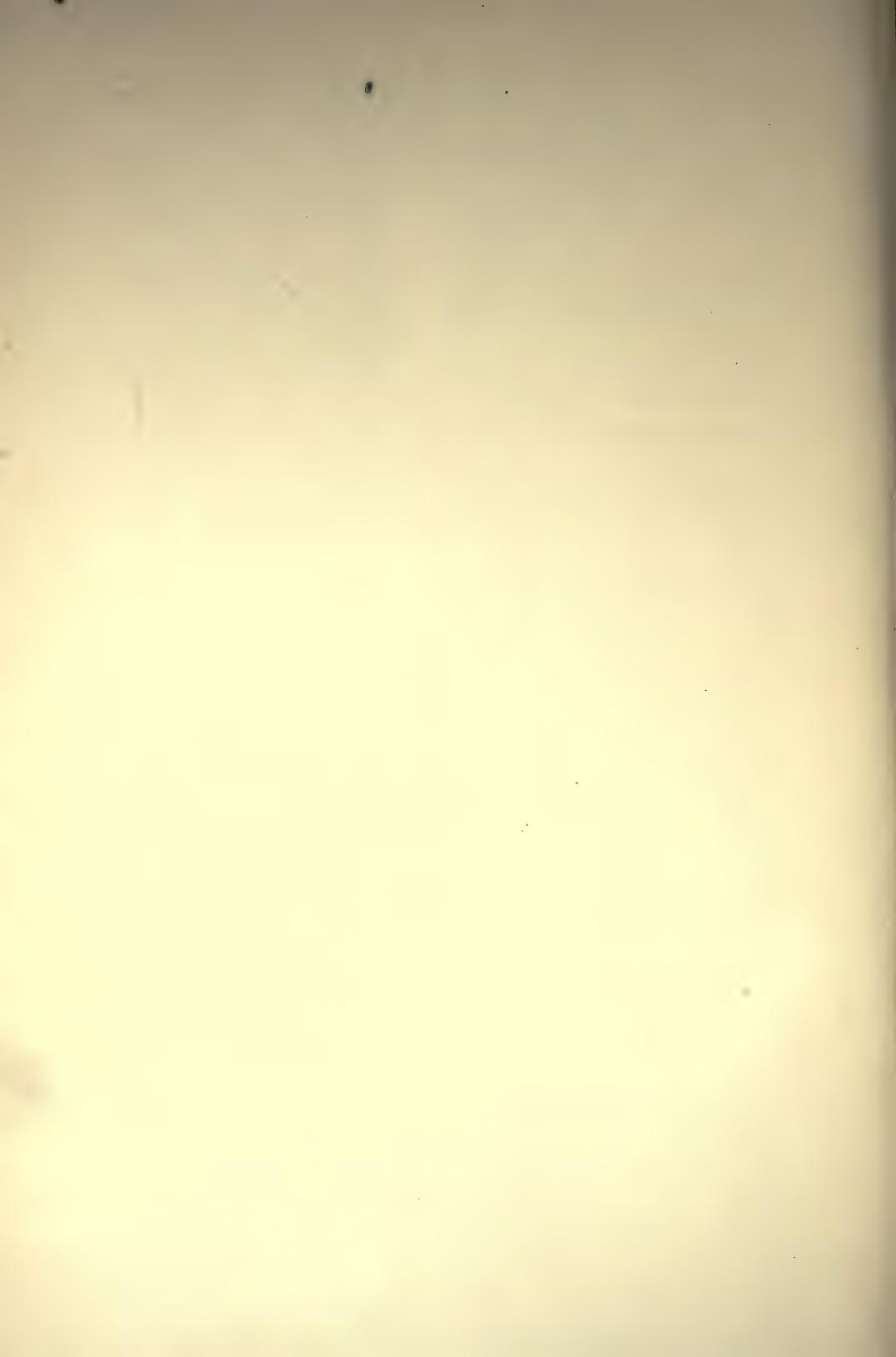
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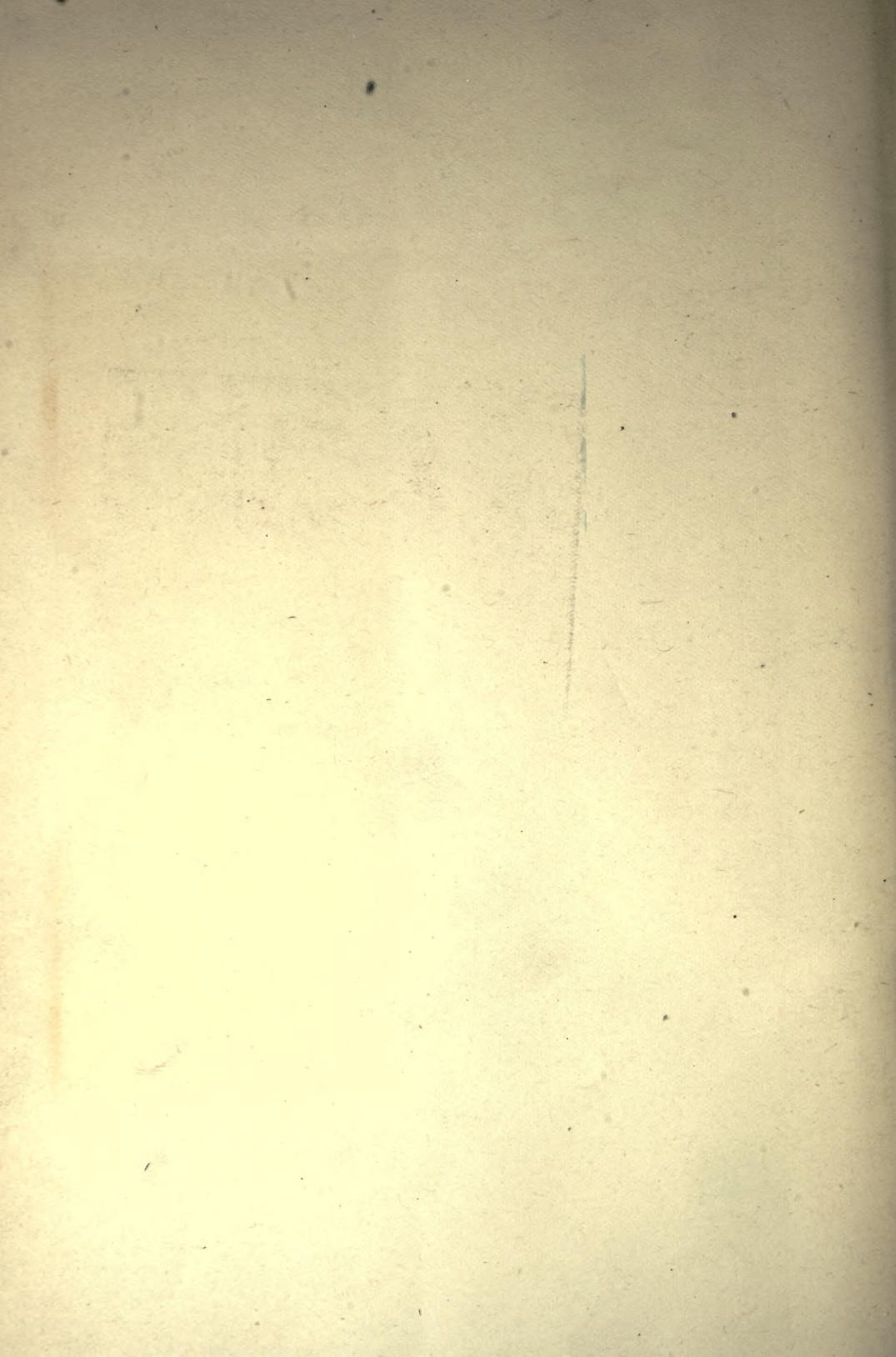
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